RAILROAD GAZETTE

FRIDAY, JANUARY 15, 1897.

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Contributions.

Helical or Spiral?

TO THE EDITOR OF THE RAILROAD GAZETTE:

Technical terminology, having had for its builders and users mostly careful and scientific workers, is, from the nature of its origin, and in spite of its great wealth, wonderfully free from confusing terms. This, however, cannot be said of a nomenclature with which the general masses, busy with the great variety of affairs of daily life, have had much to do.

Thus, engineers and others frequently have to deal with terms, which, from the commonness of the objects themselves, are anything but definite. This is the case with the terms coil and spiral as ordinarly applied to springs. A coil spring can be almost any shape, and hence this term is of little value in any precise description. A spiral spring should be one of which the axis of the rod out of which it is made will lie in one plane, the same as the axis of a rope coiled flat upon the floor. I know that good dictionaries define a spiral spring to be one of which this axis lies in numberless planes, that is, one whose form is like that of a rope wound along a broom-stick. But the office of the dictionary is not to make words, but simply to treat of those already found in a language. There hardly seems to be sufficient reason for continuing to apply the term spiral spring, as is usually the case, to one of the last-described form, when it is remembered that just such a curve as that assumed by the axis of the rod out of which this spring is made is none other than a helix. To call it a helical spring would be much better. The practice of applying one term to two things so widely different in form, when there is a name by which if either be called it is specifically described, is confusing. The first requisite for a lucid description of any piece of mechanism or object is a precise terminology. Although the subject of good and appropriate terms may seem but small, it is, nevertheless, deserving of the consideration of those bodies influential in such matters, as well as the present efforts to establish a uniformity in parts.

PRECISIAN.

The "One-Railroad State."

SAN FRANCISCO, Jan. 8.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It was startling to note that California during 1896 built more miles of railroad than any other state in the Union. This has appeared somewhat remarkable to those who have always regarded California as inadequately supplied with transportation facilities, and who have dubbed it the "one-railroad state." This one railroad, "The Octopus," alias the Southern Pacific Company, has been the object of political and civic hostility for 20 years. Now that 125 miles of the San Fransisco & San Joaquin Valley Railroad has been constructed and is open for passenger and freight business and competes directly with "The Octopus," there is evidence that this hostility is rapidly abating. This new railroad has almost completed its financial arrangements for increasing its line to over 300 miles during 1897.

That California is inadequately supplied with railroad lines seems contradicted by the fact that there is over 5,000 miles of line for 1,500,000 inhabitants. The parallelism of all the main lines of road in California is very marked, and from a glance at their position as shown on any of the maps published by the Railroad Commission a relief map of the state might readily be constructed. All the lines are located in the valleys with regard to the available passes across the mountain ranges. The choice of location is very limited, thus the new road (the San Francisco & San Joaquin Valley Railroad) passes down the valley between two lines of the Southern Pacific Company.

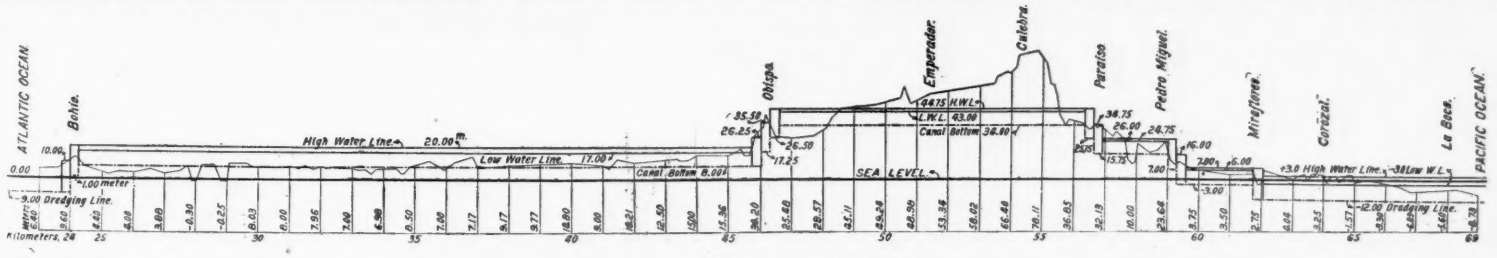
Of the 5,040 miles of railroad in the state 3,140 miles are operated by the Southern Pacific Company; 494 miles by the Southern California Railway (Santa Fe); 253 miles by the Atlantic & Pacific; 165 miles by the San Francisco & North Pacific; 125 miles by the new road, the San Francisco & San Joaquin Valley. Thirty-three companies share the remaining 863 miles, so that the charge of its being a one-railroad state is somewhat in error. Of this mileage about 280 miles was built in 1896; and 161 miles of it was constructed and equipped for passenger and freight traffic at an average cost of $14,150 per mile, as against a cost of $28,000 per mile for the lines of the Southern Pacific Company, with which these new roads compete.

R. L. D.

The New Panama Canal.

We have mentioned in times past the great amount of money and time and pains expended by the new Panama Canal Company in collecting accurate information of the physical conditions to be overcome in carrying out the revised project for the Panama Canal. The money for these operations has been supplied by some of the security-holders and by a syndicate of bankers in Paris. The plan has been, and probably still is, to lay the whole project and the information collected before an international Board of Engineers before the final decision is reached as to whether or not it is wise to go on and build the lock canal on the new plans. Meanwhile we are enabled to show the project as provisionally adopted. In deciding on the general plan for the proposed lock canal the company has taken into account the technical, administrative and economical considerations. The aim has been to lay out a scheme not only feasible from a technical standpoint, but practicable financially.

In order to utilize the work already accomplished, as far as practicable, the line of the canal will follow the line adopted by the old company for the sea-level canal, and upon whose whole length work has already been begun.



Profile of the Proposed Panama Lock Canal.

All Distances and Levels are in Meters.

Profile.—The profile of the lock canal will be as follows: The elevation of the summit level (bottom of channel) will be 34 m. above mean sea level. Though this elevation of 34 m. is adopted as a starting point for the proposed work, it is not to be considered as unchangeable. The company will endeavor, either during its investigations or while work is in progress, to lower as far as possible the channel at the divide below this elevation of 34 m., should the conditions for excavating the large cutting which will constitute the divide be found favorable.

The harbor channel at the Atlantic end will be at about mean sea level, the tide being of no account at that point. The harbor channel at the Pacific end will, on the contrary, vary between the elevation (+3m.) of high tide and the elevation (—3m.) of low tide. The total rise from the bottom of the sea channel to the above mentioned elevation of +34m. would be 43 meters on the Atlantic side, and could reach 46 m. on the Pacific side.

The rise will be provided for by five locks on each slope. The maximum lift of each lock has been put at 10 m., and this is one of the considerations which have determined the elevation of the bottom of the summit level channel to be not greater than +34m.

Chains of Locks.—These locks will be distributed on each slope as follows:

On the Atlantic slope are two successive locks at the kilometric point 24 at Bohio Soldado, and three successive locks at the k. p. 46 at Obispo. On the Pacific slope, are one lock at Miraflores, k. p. 62; two successive locks at Pedro Miguel, k. p. 59; and two successive locks at Paraiso, k. p. 56.500.

The successive levels will be determined by the locks and by the dams which close the valleys transversely where the locks are to be placed. These locks will therefore form lakes of varied extent to receive directly the waters for the canal. The only really important one will be the one for the locks and dams at Bohio. This lake, of a surface of about 3,000 hectares (1.16 sq. miles) will receive besides the Chagres River, whose flow is to be regulated by a higher lake, to which we shall refer later, the tributaries of the stream of water between the summit level channel and the dams in the valley at Bohio. The maximum level of this lake will be +17m. At the times when the floods empty into the lake the level could be raised to +20m. The discharges from the lake will be led through special waterways below the dam.

Water Supply.—The supply of water for the canal will be taken from the Chagres River, by means of a dam to be erected at a higher point than above described and from there carried to the summit level canal. A very favorable site for the erection of this retaining dam is found at a distance of about 15 km. from the canal, at Alhajuela. The level of the water of the lake, which level is made possible by the erection of the dam, is to be maintained at about +60 m., and in this way a fall of almost 15 m. can be employed to feed the canal at the summit level cnannel. The necessary volume has been estimated to be in the neighborhood of 20 cu. m. per second. The water will be carried either by metal conduits under pressure, by open ditches, or by a combination of the two systems as may seem best after proper investigations are made.

Regulation of the Chagres.—The lake above referred to will, at the same time that it provides a direct means of feeding the canal, form a basin for the regulation and control of the floods of the Chagres River. Works for regulating the flow will be built conjointly with the dams in order to restrain, within definite limits, the volume discharged below the dam into the lower lake formed by the dam at Bohio and to store this excess in the higher lake. The storage capacity of these two lakes whose floods will be provided for by a system of regulating works, will completely control the floods of the Chagres River and its tributaries so as to avoid at all times any danger in the canal navigation.

Though the site already mentioned seems to be the most favorable for the location of the dams to control the water stored for feeding the canal, it is possible that on further investigations the company will be able to put the dam nearer to the canal. The principle of its construction will not be modified, and it will retain the twofold aim of feeding the canal and at the same time controlling the floods of the Chagres River.

Dimensions of Locks.—The locks will be built sufficiently large to accommodate the largest trading vessels. They will be in pairs, of a clear length of 200 m. and a width of 25 m. for one and 18 m. for the other. In the vicinity of the high and low locks there will be various docks for the vessels, so as to facilitate their movements as they pass in and out, and to allow them to pass among those waiting at the locks.

Width of the Canal.—The width of the canal varies with the change in elevation of the water level. From the ocean lock on the Atlantic side, to the k. p. 24, the width proposed is the same as that already cerried out by the old company, viz., 22 meters wide at the bottom and 50 meters wide at the water level. Several basins will be provided in this course for passing vessels. Besides it will not be difficult, while the work is in progress, to increase the width of the canal if necessary in order to allow an ample double channel throughout its length.

In the level formed by the Bohio Lake, between k. p. 24 and 46, there will be, possibly, excepting the last four kilometers, a width and depth of channel sufficient for two vessels to pass one another.

At the summit level which includes the great cutting at the divide, about seven kilometers in length, the normal width of the canal will be 25 m. at the bottom and 50 m. at the water line. At the two ends of the channel near the locks there will be formed by the building of the dams attached to the locks to close the channels, small lakes forming anchorages and waiting basins for the vessels. Toward the middle of the channel a basin will be constructed to pass vessels.

In the next two levels the width of the canal will be 25 m. at the bottom and 50 m. at the water level.

Finally, it is proposed to give the entrance channel on the Pacific side a width at the bottom of 30 m. with long slopes of 5 to 1 on account of the swampy nature of the ground. Under these conditions vessels could pass one another throughout the entire length of the channel.

The Railroad.—The above described plan will require a change in location of the Panama Railroad in the por-

tion between Bohio and Miraflores for a distance of about 40 km. This change in location will be made to the left of the canal, so as to avoid the railroad crossing the canal.

General Information.—While preparing the complete plan of the work to be undertaken in building the lock canal, on the above basis, the company is already carrying on at the Isthmus important work with two objects in view. One of the most serious obstacles, and in fact the only real one which has, up to the present time, prevented the building of the canal, not only from a technical standpoint but in the opinion of the public, is the cutting at the divide which will constitute, in the future canal, the largest portion of the summit level channel. Partly due to the conditions of the ground to be met with in this cutting and partly due to the methods at our disposal for carrying out the plan proposed, the successful completion of this section of the canal has been considered the most uncertain; this uncertainty being due not only to the technical difficulties to be met with but also to the great expense.

To put the company in a more secure position before engaging in the full undertaking of this work, it has been decided:

1st. To obtain and establish proofs from completed works of this canal of the possibility of excavating the deep cutting, under the conditions to be met with in building the canal as adopted by this company.

2d. To obtain by preliminary work on the canal unquestionable data for the estimation of the expense of the proposed work.

This is the twofold aim of the work in which the company is now engaged at the Isthmus. This work is confined for the present, first, to the opening of the cut at the summit between the k. p. 48 and k. p. 56 of the canal; second, to building a summit level canal, which is to be used as a "preparatory cunette" resembling greatly by its proportions the final summit level canal, in order to show that its completion by enlarging and deepening the preparatory canal will not present any special difficulties. At the same time, by the construction of this "preparatory cunette" the company will acquire reliable information to aid in estimating the cost of the remaining work.

This "preparatory cunette" which is to prepare the way for the final cutting, is to have a width of 15m. at the bottom and a depth reaching to the elevation +44 m. The total amount of excavation represented by the above is about three million cubic meters. This work is carried out with the appliances for excavation and transportation of the old company, and in addition thereto, with several new machines for removing the excavated earth, with which the new company has seen fit to provide itself for the most speedy method of finishing the work. These machines are mainly cableways provided by a New York firm.

The company has taken all necessary measures to complete, in the shortest time possible, the excavation of the cutting herein referred to; and it is hoped that it will be successfully completed within two years.

New York Railroad Commissioners' Report.

The Railroad Commissioners of New York have sent to the Legislature the 14th annual report of the Board. It is signed by Messrs. Beardsley and Chapin, Commissioner Rickard having died while the report was being made.

The first chapter is on the "general situation," in which the Joint Traffic Association is mentioned with approval. The physical condition of the railroads of the state "has not been permitted to deteriorate beyond the limit of positive safety." Some of the smaller lines evidently have had to allow some deterioration, but they "have made up for this by extreme caution in operation." In two instances the Board has had to threaten to order a suspension of operations unless certain repairs were made, but the order was promptly complied with and trains were not suspended. Only three passengers were killed in the state from causes beyond their own control. The Board takes credit for being the prime mover in much of the progress in safety appliances that has been made in New York since 1883. The length of railroad in the state is now 8,070 miles, 38 miles more than the year previous. The statistics of operations and earnings we omit because they include much business outside of New York state, but the summary of the reports of the *street* (surface) railroads is as follows (cents omitted):

STREET RAILROAD STATISTICS, STATE OF NEW YORK.

	For year ending June 30, 1896.	For year ending June 30, 1895.
Capital stock	$107,561,909	$89,693,589
Funded debt	95,411,173	80,180,423
Unfunded debt	21,878,921	12,056,519
Cost of road and equipment	203,928,300	170,647,265
Gross earnings from operation	28,808,898	25,477,227
Operating expenses	17,848,759	16,628,451
Net earnings from operation	10,960,139	8,848,775
Income from other sources	1,428,192	942,960
Taxes and miscellaneous	1,349,313	1,095,472
Interest	3,238,270	2,911,115
Rentals	3,853,211	3,620,245
Dividends	3,379,953	1,993,772
Surplus for the year	479,078	171,130

There is also a statement of traffic and average receipt and cost per passenger and per car mile, which we reprint on this page.

Under the subject of new laws reference is made to that requiring bicycles to be carried free and the mileage book law, which compels the sale, at two cents a mile, of 1,000-mile tickets, at all stations of any consequence, the tickets to be good for the purchaser, his family and agents. The report says:

Much complaint has been made by the railroad companies regarding advantages taken of this law by ticket scalpers, and several suits are now pending on account of refusal of agents to give in exchange for mileage book coupons more than one ticket to the same person for his individual use on the same day when the ticket first purchased is for such a distance from the place of starting that it would be impossible for him to make the journey and return in time to use the second ticket. In order to prevent what the railroad companies regard as an evasion of the law, some of the railroads require the applicant for an exchange of coupons to give the name of the person for whom the ticket is obtained, the relation to the holder of the mileage book, and such other particulars as will enable conductors to identify the person presenting the ticket with the description written thereon. It is quite likely an attempt will be made this winter to secure further legislation upon this subject. The purpose of the law was to enable frequent travelers on railroads to obtain substantial commutation rates, and not to encourage a general traffic in tickets by unauthorized persons for their own profit as has followed in practice the enactment of the law.

In connection with the bicycle law it may be stated that constitutional objections have been raised by one company, and test cases are now pending in the courts.

In the general revision of the tax laws of the state many changes were made applicable to railroads; these are enumerated in an appendix to the report.

The volume of business before the Board is increasing yearly, and important meetings have to be held frequently. There have been 33 applications under Section 59 (requiring the Board to approve or disapprove proposals to build new railroads). Several appeals have been taken from the decisions of the Board, but only one, that reported in the *Railroad Gazette* of Dec. 25, has been decided against the Board.

The number of complaints received has been 68, and there have been applications to remove stations to change motive power on street roads, to increase capital stock, to be exempted from the coupler law, to use a cook stove in a car and on other subjects. There have been 28 complaints in relation to mileage books.

Under the head of physical condition there is a summary of the opinions of the inspector of the Board, who examined 6,263 miles of road during the year. In allowing for expansion and contraction when laying rails, many roads now use a different percentage in cuts and shady places from that allowed in places exposed all day to the sun. Cedar ties are no longer used upon the large roads; yellow pine is most generally preferred. Tie plates are used with good results on these ties. Several roads insert the bolts at rail joints from the outside, bringing the nut on the inside where it is more easily inspected by the track walker. On the inside the ends rust on, not being affected by dropping oil as upon the outside. Where there are six bolts, the two end ones may be nutted upon the outside.

The lack of any safety blocks in frogs and guard rails is still a noticeable defect in New York, and the Commission recommends a law compelling the use of metablocking. It is held that every siding should have a derailing switch to keep cars from running to the main track, unless the grade of the siding is at least 15 ft. per mile downward away from the main track. Many facing point switches have been taken out during the past year, and some single-track roads have put in "dead ends" to increase safety.

The inspector finds all the railroads agreed that curves of two degrees or over should always be spiraled. Trains now run so fast that curves are very frequently traversed at 60 miles an hour, and if there is no transition curve this speed makes very disagreeable shocks. It is held that the outer rail of curves should be elevated for the fastest trains, even if there are many slow trains. When the speed of a train is slow on such a curve the cars tend to slide toward the inner rail, making a severe strain upon the axles, but nevertheless the safety of passengers is paramount. The inspector finds the guard rails on many bridges insufficient and even defective. They ought to be more strongly spiked and bolted and made of better rails—rails at least as heavy as 65 lbs. per yard. Switch guard rails should have more than two braces.

Of the wooden bridges still remaining in the state several will be superseded by iron during the coming year.

Considerable interlocking has been put in during the past year, and the inspector holds that compressed-air apparatus for moving switches is now beyond the experimental stage. Fences have received considerable attention during the year, but where the farmers maintain them the duty is poorly performed, and some of the railroads fail to adequately protect highway crossings where the street lies at an acute angle with the track. Barbed wire is fast disappearing. The wire agents tell the railroads that fence posts need not be closer together than 24 ft., but the inspector thinks that the interval should be 10 ft. Cattle guards of the old open-pit kind are "fast disappearing." There are complaints that slat guards do not turn animals satisfactorily, but the inspector thinks this is because the guards are not long enough. They should be 50 per cent. longer (along the rail) and should always be placed at right angles to the track.

The board renews its former recommendation of a law to begin the gradual abolition of highway grade crossings, as also a law requiring passenger cars to be lighted by gas or electricity. Nearly all the large roads now use the block system to some extent. Farmers complain of insufficient fencing, and the board recommends that the legal definition of a proper fence be made more precise. The accident record shows:

	1896 Killed.	1896 Injured.	1895 Killed.	1895 Injured.
Passengers	18	196	17	119
Employees	197	917	181	636
Others	463	494	496	376
Total	678	1,607	694	1,125

Accidents reported on street surface railroads were as follows:

	1896 Killed.	1896 Injured.	1895 Killed.	1895 Injured.
Passengers	13	197	5	127
Employees	7	35	5	17
Others	51	159	49	103
Total	71	391	59	247

The most serious operating difficulty with which the board has had to deal has been the overcrowding of street surface cars, especially on Sunday in the summer, and severe legal penalties are recommended. There is no reason why careless and dangerous methods should be tolerated on street roads more than on steam railroads. The board recommends that crossings of street railroad tracks, one with another, be regulated strictly by law, inter-locking signals being required. The agitation for the use of fenders has somewhat subsided, a satisfactory fender not having yet been found. Some fenders have been the direct cause of injury to persons. A satisfactory power brake for street cars has not yet been obtained. The board recommends a law compelling the heating of street cars in the winter.

The experiments with compressed air motors on the Metropolitan and the Manhattan roads in New York City are briefly described.

Besides the recommendations already noted, the board asks for further restriction of the issue of stock and bonds and an amendment to section 59 concerning the power of the board to approve parts of proposed new railroads as well as the whole.

NEW YORK STREET RAILROAD STATISTICS.

From the annual report of the Railroad Commissioners of the state of New York, containing statistics to June 30, 1896, we copy the following table, showing, for the street surface railroads of the state, receipts and expenditures, per passenger, and cost of operation per car-mile.

Name of Road.	Number of passengers carried.	Total car mileage.	Based upon gross earnings from operation and operating expenses.		Based upon receipts from all sources, and total expenses, including fixed charges.		Cost of operation per car-mile.	Total expenses, including fixed charges per car-mile.
			Average earnings per passenger.	Average cost of operation per passenger	Average receipts per passenger.	Average expenses per passenger.		
			Dollars.	Dollars.	Dollars.	Dollars.	Cents.	Cents.
Albany	9,511,556	2,229,977	.0565	.0360	.0570	.0446	15.35	19.00
(a) Atlantic Avenue	14,473,770	3,575,482	.0482	.0318	.0522	.0473	12.88	19.12
Binghamton	3,381,652	839,509	.0397	.0229	.0402	.0337	9.26	13.61
Brooklyn City & Newtown	13,453,786	2,332,536	.0409	.0250	.0420	.0346	14.44	19.57
Brooklyn Heights	106,686,306	21,500,745	.0400	.0234	.0422	.0426	12.10	16.96
Brooklyn, Queens County & Suburban	15,440,760	3,389,491	.0443	.0292	.0455	.0516	13.31	23.50
Buffalo	39,571,328	6,262,500	.0346	.0171	.0352	.0277	10.87	17.52
Coney Island & Brooklyn	6,589,165	2,062,044	.0552	.0340	.0557	.0425	10.87	13.58
Crosstown-Buffalo	13,732,46.	2,747,028	.0323	.0213	.0325	.0304	10 66	15.02
Kingston City	1,029,631	187,650	.0503	.0304	.0511	.0404	16.71	22.20
(b) Metropolitan Street	174,416,247	23,511,987	.0418	.0230	.0458	.0372	17.06	27.63
(c) Nassau	14,302,463	4,624,224	.0500	.0307	.0513	.0474	9.51	14.67
Newburgh Electric	1,64 ,000	419,789	.0576	.0353	.0589	.0552	13.82	21.57
Rochester	17,347,940	5,010,862	.0507	.0330	.0519	.0510	11.45	17.64
(d) Syracuse Consolidated	2,848,984	1,266,923	.0499	.0569	....	....	12.81	....
Syracuse Street	5,908,979	1,687,463	.0485	.0268	.0489	.0355	9.39	12.43
(b) Third Avenue	62,500,000	12,663,310	.0420	.0242	.0427	.0297	11.94	14.69
Troy City	10,071,508	2,308,734	.0512	.0361	.0516	.0396	11.42	17.28
Union	9,722,361	2,486,964	.0502	.0315	.0505	.0443	12.25	17.34
Utica Belt Line	3,518,244	827,095	.0470	.0312	.0474	.0436	13.29	18.57
Steinway	6,651,255	1,885,638	.0495	.0290	.0539	.0461	10.33	16.29
(x) Central Crosstown, New York	14,349,756	1,915,044	.0390	.0277	.0394	.0350	20 80	26.02
(x) Dry Dock, East Broadway & Battery	18,442,305	2,449,868	.0403	.0305	.0410	.0375	23.00	28.25
(x) (c) New York & Harlem, Fourth avenue, New York	16,897,212	3,219,183	.0500	.0344	.0554	.0377	18.06	19.79
(x) (f) Thirty-fourth Street, New York	9,835,893	775,576	.0296	.0132	.0297	.0297	16.85	37.60

(a) Includes nine months' operation. Remaining three months in Nassau report. (b) Includes all lines operated by both mechanical and animal. (c) Includes three months of Atlantic Avenue system. (d) In hands of Receiver, made no payment on account of interest on bonds. (e) Made no payments on account of funded debt. (f) Net income paid direct to Metropolitan Street Railway Company as rental of tracks, amount included in fixed charges.
(x) Operated wholly by animal power.

Electrically-Driven Heavy Machinery.

In our issue of June 12, 1896, we published an illustrated description of a heavy punch made by the Hilles & Jones Co. Since that machine was placed on the market improvements have been made and different types have appeared. The engraving, Fig. 1, will give a general idea of the construction of a new heavy combined punch and shears. It is a very massive and substantial machine, capable of punching 6 in. holes in ¾-in. steel. The main frame is of box form

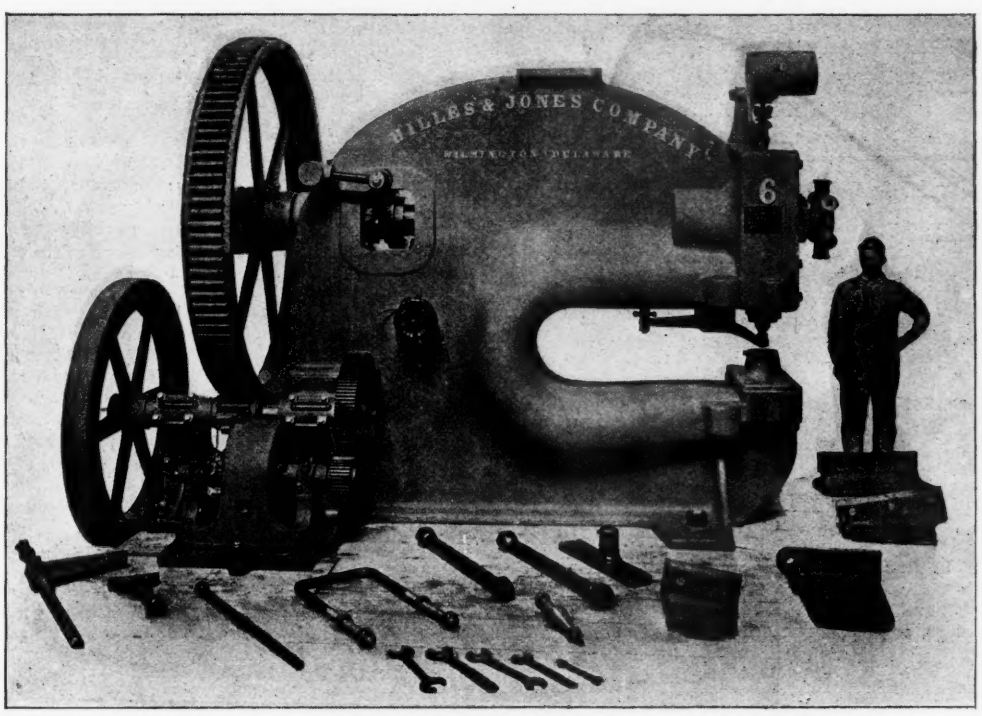


Fig. 1.—Electrically Driven, Combined Punch and Shear.

throughout and weighs nearly 40,000 lbs. in a single casting. It is well adapted for shearing plates and bars as well as punching, the knife blocks being secured to the nose and the sliding head by through bolts and tongues so that they can be readily removed without injuring the main frame. The sliding head is counterbalanced through a spiral spring and has a tapered brass shoe for taking up the wear. The spur wheel is large, with turned shrouds, the clutch which engages with this being controlled by an improved adjustable automatic stop which allows the sliding head to be brought to rest at any desired point of the stroke. The motor is mounted on an extension base connected to the main frame and drives on to the fly-wheel shaft through a pair of cut gears. This method of construction takes up but very little floor space, considering the capacity of the tool, and makes it entirely self-contained. It avoids also any pipes or belting which might interfere with overhead traveling cranes and has proved itself an economical and most satisfactory method of driving.

The set of bending rolls illustrated by Fig. 2 shows a machine for general locomotive and boiler work on plates up to ¾ in. in thickness. One of the special features of this design is that the driving is done through two electric motors, each of which is controlled by a reversing rheostat, the larger one of the two motors drives the bottom rolls through a series of gears, while the smaller motor raises and lowers the top roll. The general features of the plate bending rolls made by company are followed in the details of this machine, such as heavy bed plate under the entire machine, center support for the bottom rolls. trunion bearings for the top roll, solid extension for counterbalancing and hinged back housing, so that plates bent to a full circle can be readily removed. This type of machine is furnished for any desired capacity and can be supplied for either belt, steam or electric driving.

Both of these machines were furnished to the new Sormova Works at Nijni Novgorod, Russia.

The Long Island Railroad and New York City.

About four years ago Mr. Charles M. Jacobs, Consulting Engineer to the Long Island Railroad Company, prepared for Mr. Corbin plans for a tunnel to pass under the lower end of New York City, cross the East River, continue under part of Brooklyn and join the Long Island Railroad. That project, somewhat modified, now appears again in the report of a Brooklyn Commission on certain improvements in the condition of certain streets and in the means of travel.

The Commission, of which Eugene G. Blackford is Chairman, was appointed to investigate the condition of Atlantic avenue in regard to the railroad tracks there and to prepare and submit plans for the amelioration of present conditions and for continuing the line by tunnel to New York. The report of the Commission, with maps and diagrams showing the line of travel proposed, was submitted to Mayor Wurster, of Brooklyn, Jan. 8.

It is stated that the proposed tunnel can be built at an estimated cost of about $6,000,000. The charter belongs to the Pennsylvania Railroad, and permits the continuance of the tunnel to Jersey City, should it be deemed advisable. Mr. Corbin, during his lifetime, obtained from the Pennsylvania road the right to use this charter.

The plans of the Commission have been approved by the management of the Long Island Railroad, which will lend all possible aid to carrying them out. The details of the plans a e outlined in the report as follows:

The project of connecting Brooklyn with New York by means of a tunnel from the Flatbush Avenue Station in Brooklyn to Cortlandt street in New York was taken into consideration in connection with the study of the Atlantic avenue problem, and the tunnel construction should be considered as an important item in the report of the Commission. The proposition is to have a low level station at Cortlandt street, New York, about 70 ft. below ground, connecting with the elevated roads in that city, and the streets, by means of elevators, the tunnels being carried thence on that level to a station at Maiden Lane and Pearl street, connecting with the Second and Third Avenue railroads; thence under the East River, under Pineapple street and Fulton street, to a station near the City Hall, Brooklyn; thence under Fulton street and Flatbush avenue to the Flatbush avenue station, going into a depressed station at the Flatbush avenue station, about 18 ft. below grade. The tunnel will be carried under the Brooklyn streets, within the curb lines, to a station at the City Hall, which will be 115 ft. below the street grade, and will rise by an easy grade from that point, so that the bottom of the tunnel shall come above the main relief sewer at Flatbush avenue and Hanson place before passing into the depressed station. Continuing from the Flatbush avenue station the tracks will be depressed to Bedford avenue, a distance of 6,700 ft., the depression being covered by means of girders and masonry arching, restoring the surface of the street for public use for its full width. From the east side of Bedford avenue, the railroad tracks will rise rapidly in an open cut to the grade of the street, and continue on to an elevated railroad structure, which at Nostrand avenue will attain such height that full headroom will be provided for all street traffic without interference.

The physical characteristics of the ground between Bedford and Nostrand avenues are such that the rising grade of the railroad and the falling grade of the street combine to favor this transition from a depressed to an elevated structure, so that no obstruction is caused to any existing cross street, and full advantage is taken of the length of this block between Bedford and Nostrand avenues (which is the longest on Atlantic avenue). At Nostrand avenue an elevated station is proposed, and the elevated structure will continue thence a distance of 8,010 ft. to Ralph avenue.

The report says further that this plan will reduce the running time from the Cortlandt street terminus in New York to the City Hall station in Brooklyn to four minutes. The trip from Cortlandt street to Flatbush avenue would require 6½ minutes; to Nostrand avenue 9½ minutes; to Manhattan crossing 14 minutes, and to Jamaica 21 minutes.

Of course it is proposed to work trains or cars through this tunnel by electricity, and it would be an extension through Brooklyn and into New York of the suburban trolley service, which the Long Island Railroad Co. seems disposed to develop extensively; and will, we should suppose, be forced to develop. The great value of such a connection with New York will be obvious at once. The questions of cost and net revenue we cannot enter into without much more study than we have given to the project; but a fast service that would take in the lower end of New York, the most populous part of Brooklyn and an important suburban region beyond would command a great passenger business. A natural development of the enterprise would be a tunnel across the North River to a connection with the Pennsylvania Railroad.

The M. C. B. Standards.

At the December meeting of the Western Railway Club there was a topical discussion of the question "What can be done to further the use of correct Master Car Builders' standards?" Mr. Rhodes opened the discussion.

MR. RHODES: The best way to further the use of correct Master Car Builders' standards is to be sure that these standards are the best. For instance, in the coupler question—the Master Car Builders' Association before it adopted a standard coupler, spent a great deal of time and a great deal of pains in defining a principle upon which the coupler was to be constructed. As a result we now have couplers which we are all perfectly willing to accept under our cars in interchange. The same care was followed in selecting power brakes, and as a result, a brake founded upon proper principles was selected.

The care that has been exercised in the selection of the coupler and the brakes may be regarded as something which we ought to pattern after in the matter of other standards. Recently we thought we would use one of the Master Car Builders' standards on the road with which I am connected. We have always been using what we thought was something better than the form adopted by the association, in the way of a journal box lid. We used what is termed the Fletcher lid, but in order to get something that was being used by other railroads, we have lately decided to change the face of our journal box and apply the Master Car Builders' standard lid. I received a report from one of our master mechanics recently that the new lids which had been put on the boxes of our passenger equipment collect more dust and sand in one month than our Fletcher lid would in three months.

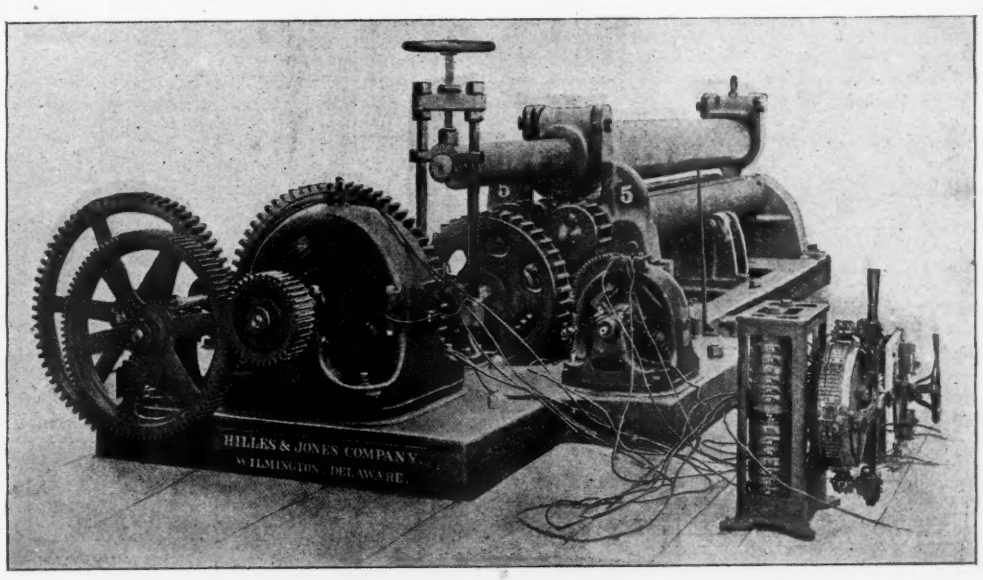


Fig. 2.—Bending Rolls Driven by Electricity.

Having adopted a Master Car Builders' standard and having decided that it is the best that can be devised, the next thing is to introduce it judiciously. If you receive a foreign car which has some special devices I do not think that it will advance the Master Car Builders' seandards to dismantle that company's standards and apply some of these various Master Car Builders' standards which do not fit and are not uniform with the rest of the car. I think that, having adopted a good standard, if those who are introducing those standards will use some good judgment in applying them, we will then be accomplishing what is best in the way of introducing the use of correct M. C. B. standards.

Mr. J. N. BARR (C., M. & St. P.): I endorse what Mr. Rhodes has said, but it comes pretty late. If he had supported me in my contention of a year ago that the rules should be construed in such a way that no allowance should be made for the changes which made a car questionable and unsafe we might have avoided the change that was made at the last convention. I am still of the opinion that that was the proper course, and if changes are made in the car which makes its safety questionable at interchange points it should not be permitted to run, but under the present rules I think that we are obliged to permit it to proceed and we must stand the consequences.

It seems to me that the Master Car Builders' Association should be extending its work in the direction of securing more standards, if possible. I find to-day that there is a tendency the other way. A manufacturer visited me recently who had two sizes of Christie brake head; he would furnish either. I asked him why he made two sizes, and he said that there was one large road which required the odd size, and they were prepared to furnish them. Now it seems to me in the case of the Christie head, it is going back on the rules seriously to adopt it and then to depart from the standard. In a great many details it is better to be a foot out of the way than one-eighth of an inch. One-eighth of an inch makes more trouble, and is more likely to produce confusion, and I for my part would rather run against an old Collin shoe, or any of the old style shoes, than one of these composite Master Car Builders' special designs. It is a bad thing, and if this club and the Master Car Builders' Association could take some means of emphatically sitting down on work of that kind, it would be a great benefit to railroads in general.

Mr. PECK (C. & W. I.): I advocate standards. I do not think there are enough of them. We need a standard draft rigging. The Master Car Builders' Association should establish a standard draw bar stop, so that a standard stop would pass inspection from one part of the country to the other. Another required improvement is a standard follower.

PRESIDENT WAITT: I think that in the past perhaps it has been a mistake of the Master Car Builders' Association in adopting some of the standards too hastily. I believe that a wise plan for the Master Car Builders' Association to adopt would be, when a committee reports and recommends a standard, to submit this to letter ballot only after its elevation to the position of recommended practice. And then as it stands as recommend practice, it should be in the hands of the committee on standards for their consideration. After it has stood as an item of recommended practice and has been in use a year, and its weak points and good points ascertained, the committee on standards could make such amendments or recommendations for amendments on the standard as are deemed necessary, or if it is found all right, they could recommend it to the Association for approval and for adoption as a regular standard.

I think that it is desirable to adopt some additional standards, as Mr. Peck has suggested. We have a draw bar stop in the list of recommended practices. I do not know whether many roads are using it. We are, and I know that others are, but I fear too many have forgotten that there is such a casting shown and that there is a standard of recommended practice in the shape of followers. I believe it to be very desirable in addition to these that we should have a standard on center plates. I think it could be adopted. If we should adopt a standard center plate, I do not believe that there would be a road that would be a loser. If we never put on a center plate under new cars but those that were standard, and if when we give cars general repairs we put on the standard center plates, I do not believe there would be any loss, but we would be getting nearer and nearer to interchangeability in cars. I cannot say that we shall ever adopt a uniform length of car, but I believe we can consistently adopt certain sectional sizes for longitudinal timbers and for end sills. I believe we could consistently adopt a standard section for timber and not have the side sill one section, the intermediate another, and so on, but have one section and use it right through. That would enable car builders and saw-mills to get out standard timber that could be used sooner or later, to keep it in stock and have it dry, and dry timber is worth 10 per cent. more than green timber to any railroad company using it, from the fact that it will prevent shrinkages and will not have the bolts loose and lost off and cause consequent depreciation of the car.

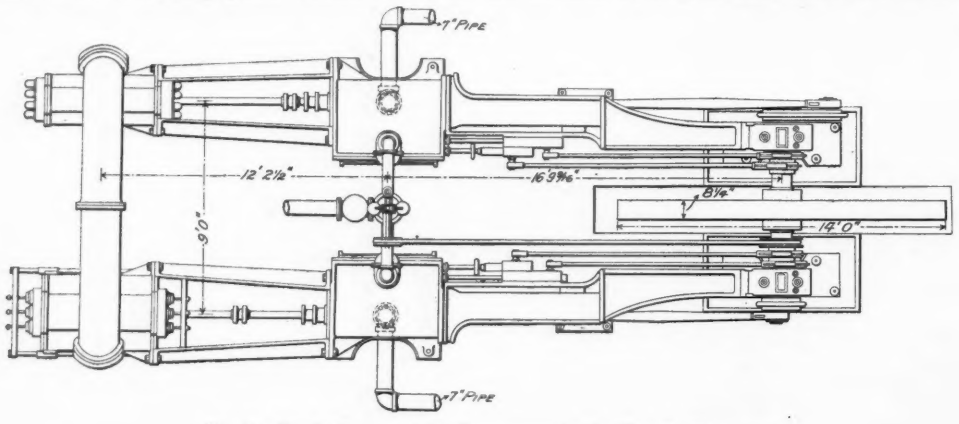


Fig. 2.—Rand Compound Air Compressor in the Topeka Shops.

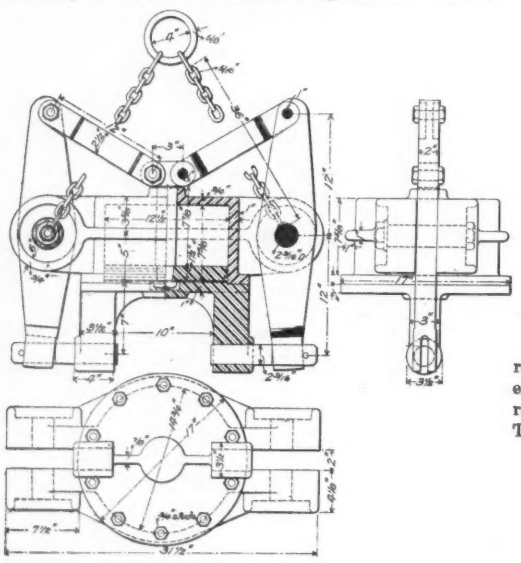


Fig. 7.—Mud Ring Riveter.

Discipline on the Louisville & Nashville.

In the *Railroad Gazette* of March 6 last some account was given of the regulations issued by the Louisville & Nashville when Brown's discipline, abolishing suspensions, was adopted on that road; with an account of the results of the change of policy as shown by the experience of five months. We now give the substance of a report made by Mr. G. E. Evans, Superintendent of Transportation, showing the operation of this method of discipline for one year, ending Nov. 30. These figures, which we find in a Western paper, are given for the different divisions separately; the Kentucky Central, the Louisville, Cincinnati & Lexington, the South and North Alabama, the Birmingham Mineral and the Louisville. We give in tabular form the number of men of each class employed, the number of men disciplined and the number of "days" charged against each class. The number of men discharged on these divisions durthe year was 55, as follows: Conductors, 9; brakemen, 32; enginemen, 3; firemen, 5; switchmen, 6.

	Ky. Cent.			L., C. & L.			S. & N. A. and B. & M.			Louisville.		
	Empd.	Disc.		Empd.	Disc.		Empd.	Disc.		Empd.	Disc.	
		Men.	Days.		Men.	Days.		Men.	Days.		Men.	Days.
Enginemen	31	11	271	45	8	115	84	21	455	70	6	105
Firemen	32	3	60	45	8	130	90	4	45	79	2	15
Conductors	28	11	282	36	14	229	62	28	430	59	7	90
Boakemen	62	16	211	98	6	85	180	48	608	129	19	175
Baggagemen	13	2	45	10	3	37	.....	.....	.....	13	2	15
Yard foremen, etc.	.....	1	30	.....	.....	.....	23	8	145	.....	1	10
Switchmen, etc.	8	3	60	.....	.....	.....	48	17	180	6	.....	.....
Hostlers	2	1	30	.....	.....	.....	.....	1	15	.....	.....	.....
Porters, train	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	.....

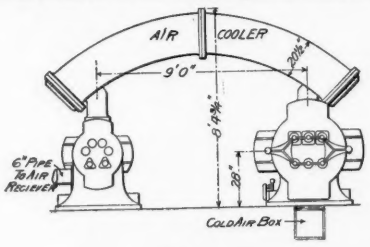


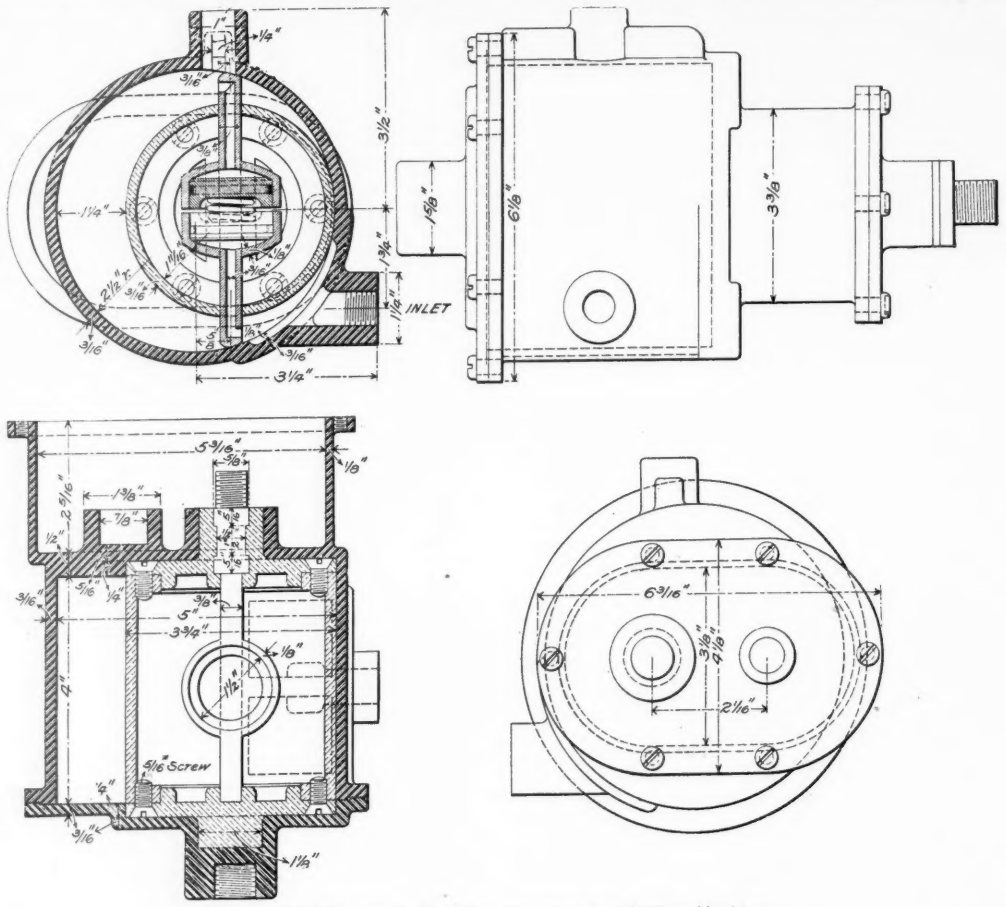
Fig. 3.

Compressed Air at the Topeka Shops of the Atchison, Topeka & Santa Fe.*

The advantages of compressed air as a motive power in shops are numerous. It is easy to handle; it has the the advantages over hydraulic machinery that no extra piping is necessary to handle the exhaust, and that a leak is not so disadvantageous. It does not heat tools like steam so that they are uncomfortably hot to handle, and there is no danger to life when inexperienced men are employed, such as occurs when electricity is used.

At Topeka, Kan., are the principal shops of the Atchison, Topeka & Santa Fe Railroad Company and in these shops compressed air is used more extensively than by any other railroad company, with an economy in time, in men and, as a sequence, in the cost of the work.

The compressed air was formerly supplied by a 12½ in. × 42 in. compressor arranged tandem with a 16 in. × 42 in. Corliss engine, assisted by Westinghouse pumps at different points throughout the shops. Now the air for the entire plant is furnished by a Rand Drill Company's Class B compressor, with cross-compound air cylinders and duplex steam cylinders, as shown in Figs.



Flg. 4.—Baird Pneumatic Tapping, Screwing and Drilling Machine.

*For statements of cost of doing work with compressed air tools in the Topeka shops see the statements of Mr. Smith quoted by Mr. Lewis in the discussion at the Western Railway Club—this issue.

1, 2 and 3. The steam cylinders are 20 in. × 48 in., with Meyer cut-off valves. The air cylinders are 16 in. and 28 in. diameter respectively, with a 48-in. stroke. The air cylinders are both water-jacketed.

The air is first compressed in the larger cylinder to 30 lbs., and then, passing through the intercooler, its pressure is increased to 100 lbs. in the smaller cylinder. This intercooler, shown in Figs. 1, 2 and 3, consists of a cast-iron shell, built to stand a pressure of 200 lbs., it is placed between the cylinders, and contains an inside system of pipes. This shell is in the form of a cylinder, slightly curved along its axis. The air is admitted from the low-pressure cylinder and in its passage through the inter-cooler the temperature is reduced by contact with the surface of the inner pipes, through which a continual stream of cold water is forced. The air is then admitted to the high-pressure cylinder and is sent from that to a reservoir.

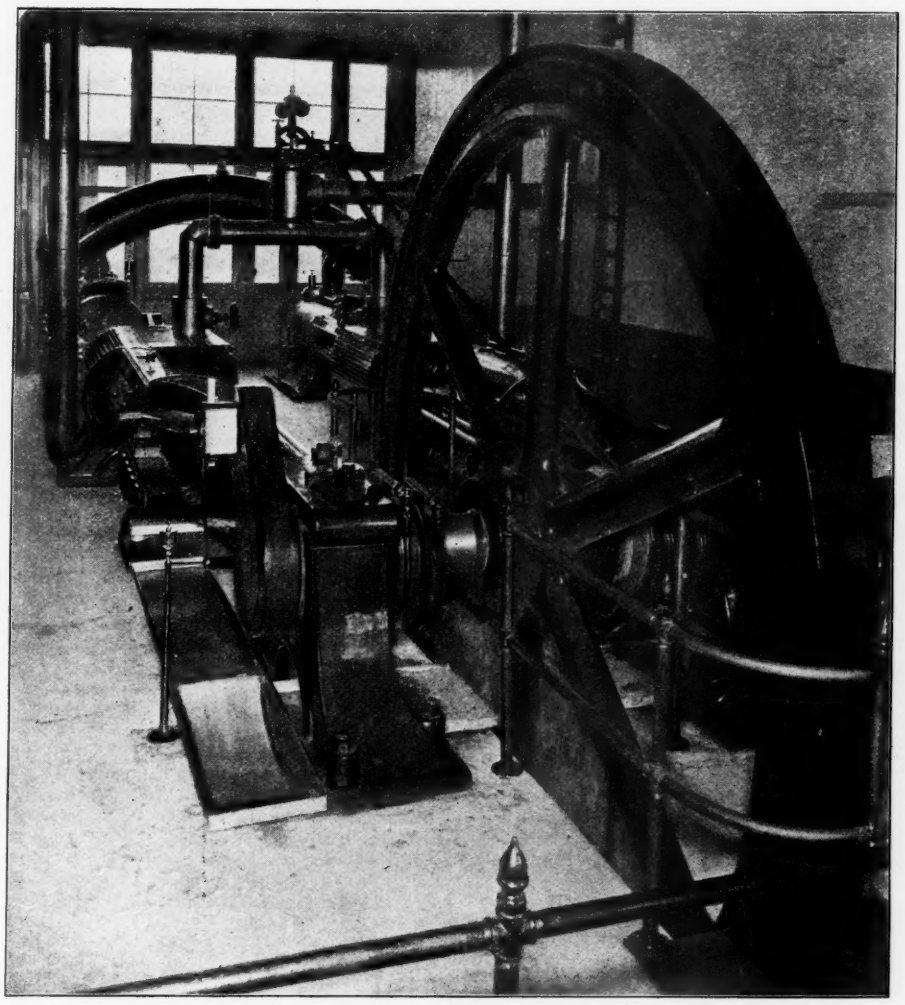


Fig. 1 —Compound Air Compressor in the Topeka Shops.

A considerable saving is shown by using this compressor instead of the former arrangement; large compressors are much more efficient in their operation than small air pumps, and where much air is used soon more than pay for their first cost. From the reservoir the air is piped underground to the different shops and throughout the repair yards in 6-in. mains. At different points are other reservoirs. In all over five miles of air piping is laid, the air in one instance being carried three-quarters of a mile to the material yard, where it is used to drive a saw, a rotary drill and a press, used to cut, drill, bend and straighten rails. Taking up the applications of the compressed air in detail we will describe its usage in the different shops and yards.

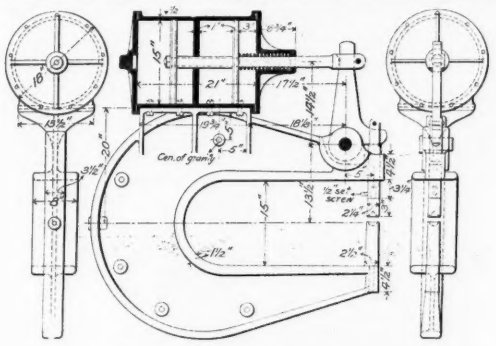


Fig 8.—Bridge or Girder Riveter.

Boiler Shop.

Fig. 4 is the Baird pneumatic tapping, screwing and drilling machine. This is a small rotary engine with a short cylinder containing a circular piston internally tangent to the cylinder. The axis of the piston is parallel to and eccentric with that of the cylinder. Through the diameter of the cylinder a sliding diaphragm of brass divides the cylinder into two parts. Air being admitted behind the diaphragm it is caused to revolve until the exhaust passage is reached. The piston speed is reduced to the desired number of revolutions by gearing. This machine is designed for drilling, tapping out for staybolts, screwing staybolts to place, reaming and rolling out locomotive boiler tubes. It weighs about 28 lbs. in working order. A set of 200 boiler tubes can be rolled out on both ends in five hours. It is an exceptionally useful tool and its use in other places will be described later.

Fig. 5 is the Baird staybolt cutter, designed for cutting off the projecting ends of staybolts after they have been screwed to their place in the firebox. It consists of a cast-iron frame with tempered steel jaws. The weight is 450 lbs., and it is swung from a movable frame placed alongside of the firebox. It will cut off 1,200 staybolts per hour, ranging in diameter from ¾ in. to 1¼ in., leaving the ends the right length for bending over, and needs only one man to operate it. The bolts are not loosened in the sheets as when cut off by a hammer and chisel.

Fig. 6 is a Baird staybolt breaker, for breaking out old staybolts. It consists of a cast-iron frame and a cylinder 15 in. in diameter. The piston rod of this cylinder operates on the long end of a lever, which is forked at the short end to receive the pulling bar *A*. The leverage gives a pull of 50 tons. The pulling bar is threaded its entire length and has a booked projection on the end that catches hold of the bolt to be broken out. A split nut, opening and closing with a cam movement, engages the bar just behind the forked end of the lever. The machine is suspended from a crane and is faced against the end of the firebox with the pulling bar entering the water space to lay hold of the bolts. The travel from bolt to bolt is adjusted by means of this split nut. The largest firebox can be cut out in 10 hours, and the machine will also pull out or cut off crown-bar bolts and all braces in the firebox.

Fig. 7 is a mud ring riveter consisting of a cast iron frame and a cylinder whose piston rod is attached to a steel toggle joint which makes connection with two heavy steel levers, the ends of which carry the rivet dies. It has the necessary spread and reach to work on double or single riveted mud rings. With 100 lbs. working pressure a pressure of 100 tons is given at the dies when the toggle is within ½ in. of a straight line. The weight is 800 lbs.

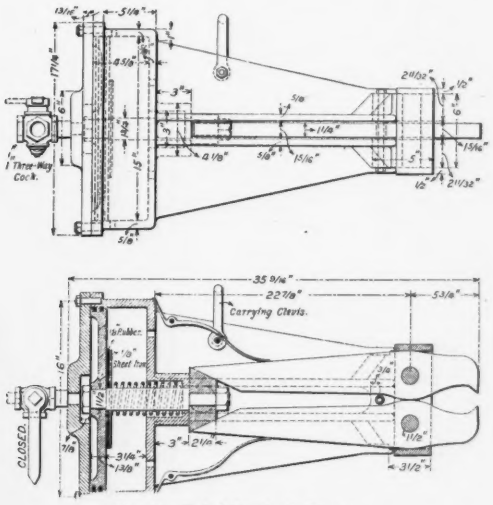


Fig. 5.—Baird Staybolt Cutter.

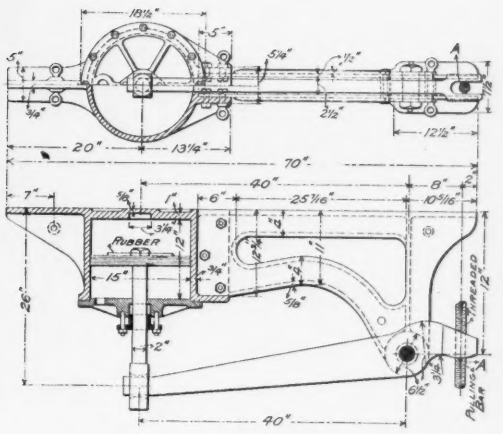


Fig 6 —Baird Staybolt Breaker.

Fig. 8 is a bridge or girder riveter having a gap of 15 in. and a reach of 35 in. The peculiar feature of the machine is the use of a double piston in the cylinder. The cylinder is divided by a 1-in. thickness of metal into two compartments, each of which has its own piston. The effect is that of two cylinders tandem and the required pressure of 50 tons is easily obtained. The result of this construction is to prevent trouble in adjusting dies to rivet different thicknesses of plate. The pressure is uniform throughout the stroke, which is 3 in. The machine weighs 1,000 lbs., but is swung from the center of gravity by a bail, and is easily handled. When used as a stationary machine the frame can be set in a shoe.

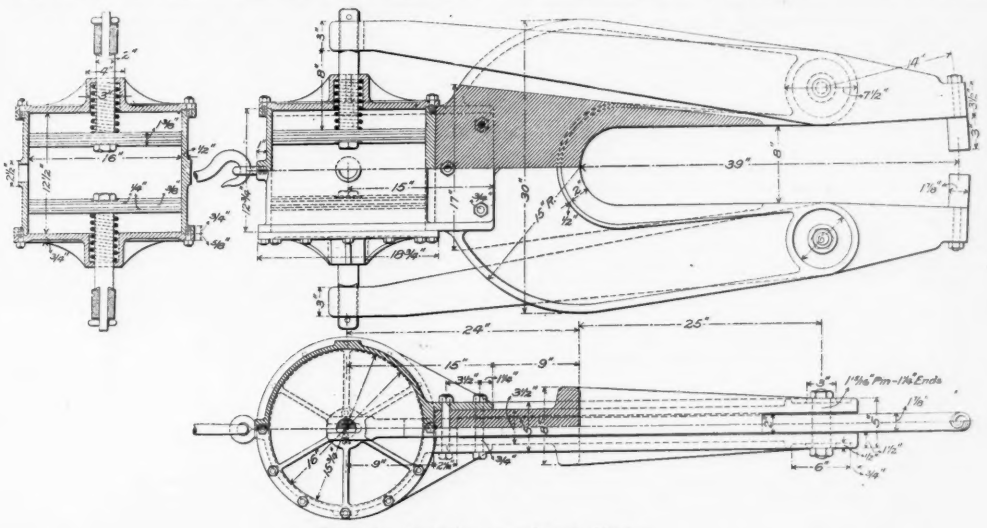


Fig 10 —Portable Long-Reach Riveter.

Fig 9 is a portable riveter used for riveting up truck frames, etc. It is suspended from a crane and will rivet

up a truck with channel transoms in about eight minutes.

Fig. 10 is another portable riveting machine with a longer reach due to the construction of the frame.

There is still another style of riveter used in riveting up tanks, not shown here. It has a spread of 9 in. and a reach of 60 in. The frame is cast steel, and the cylinder is of the double piston type, with its axis in line with the rivet dies.

Fig. 11 is a 10-ft. reach stationary riveting machine designed to do all classes of boiler work. It includes also a radial crane with a pneumatic reversible hoist, which is operated by a rotary engine, similar to that described in Fig. 4. The hoist has a capacity of 10 tons. The air cylinder of the riveter is of the double piston type described before, and has a diameter of 26 in. Either one or both pistons can be used at once, one for light work, both for heavy, thereby being economical in the use of compressed air, the total pressure exerted with 90 lbs. working air pressure being 50 tons. All these pneu-

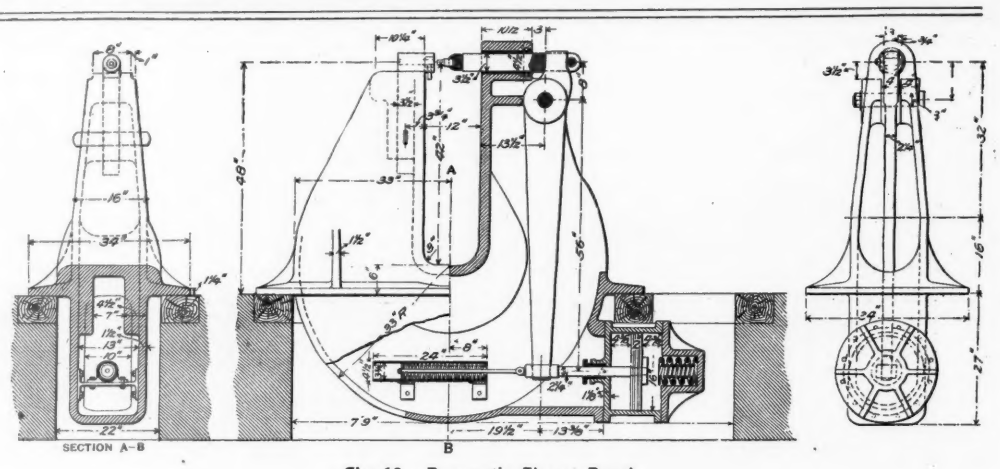


Fig. 12.—Pneumatic Flange Punch.

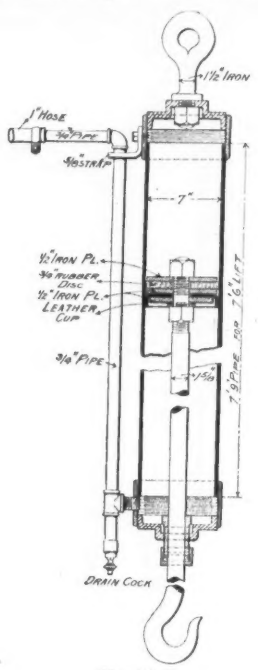


Fig. 13.

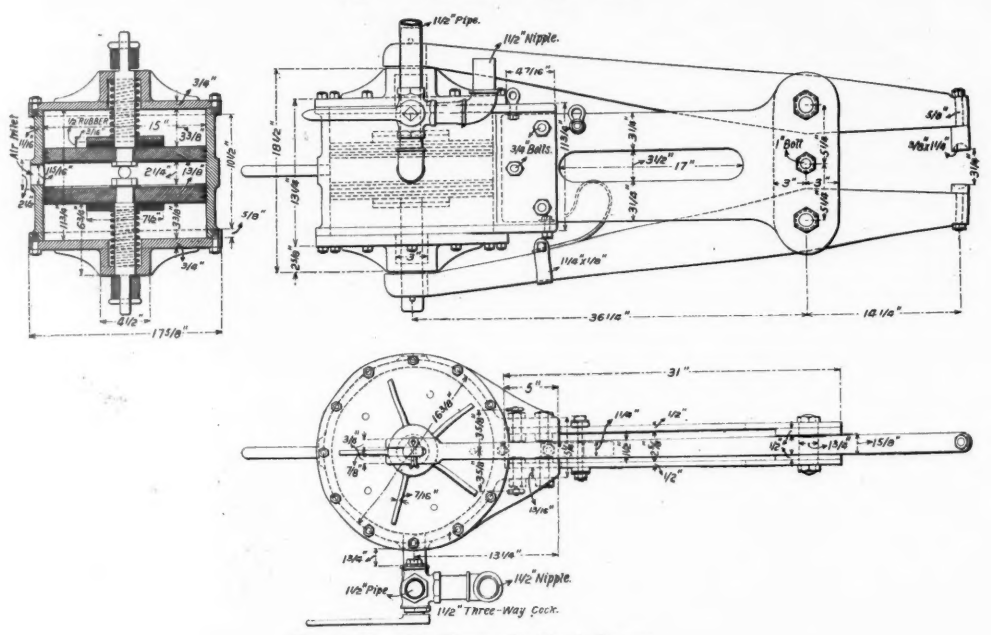


Fig. 9.—Portable Riveter for Truck Frames.

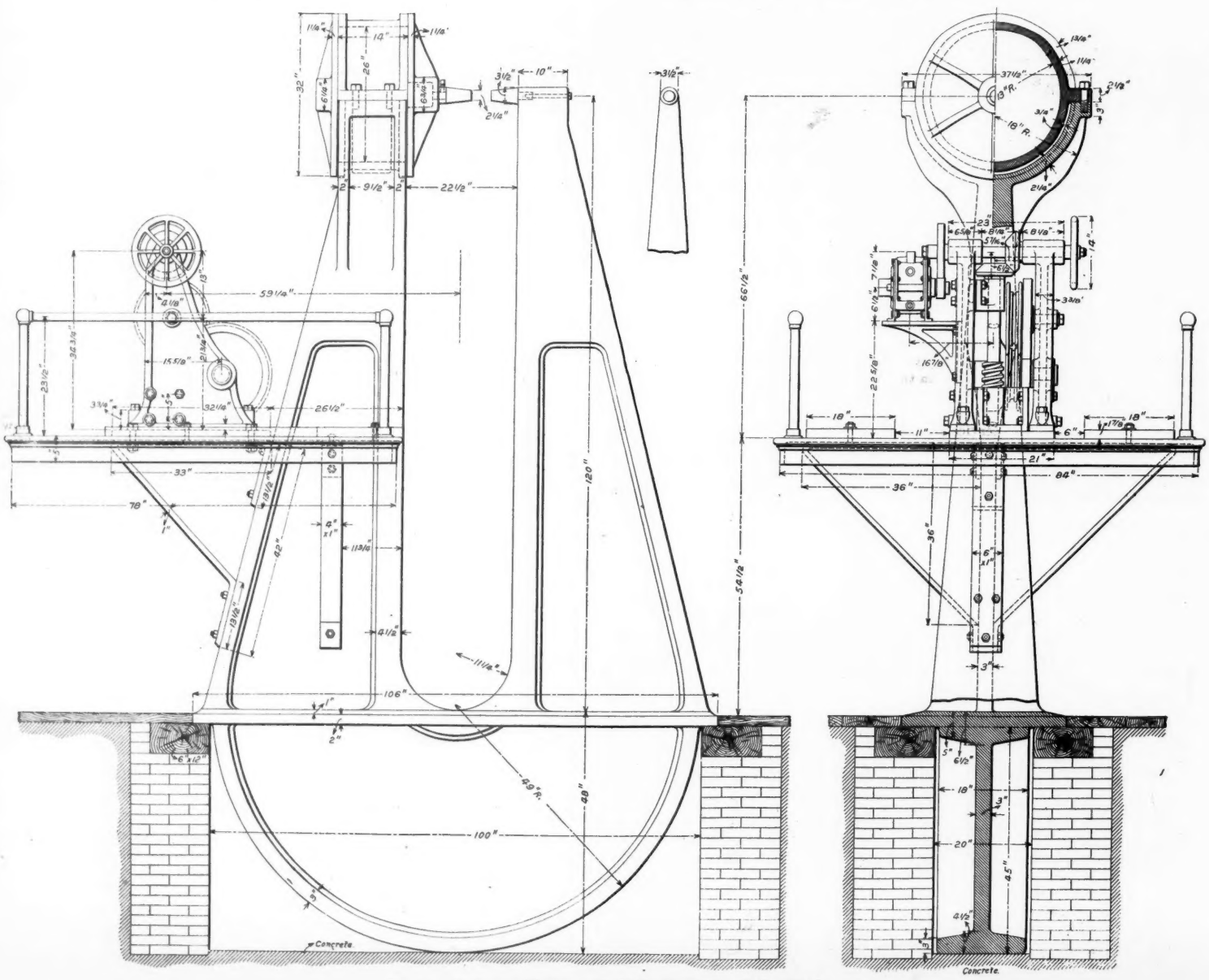


Fig. 11.—Stationary Riveter, with 10-Ft. Reach, for Boiler Work.

matic riveters have a desirable feature in that the first part of the stroke is rapid, having a local effect on the head of the rivet and binding the plate firmly together, while the latter part of the stroke is slow and powerful, upsetting the rivet so as to fill the hole completely. In this respect they have an advantage over the hydraulic riveters.

Fig. 12 is a pneumatic flange punch. It gives 75 tons on the punch, with 80 lbs. working pressure, and will punch 1¼-in. holes through ¾-in. steel.

Fig. 13 is an air hoist used in the boiler shop and many other places. It is cheap and gives excellent service. It is made of a piece of ordinary wrought-iron pipe, the ends being closed with common pipe-caps and couplings. The inside of the pipe forming the cylinder is not bored out or treated in any way, the piston constructed as shown working well in the rough pipe.

In addition to the foregoing tools, the Boyer pneumatic hammer, illustrated in the *Railroad Gazette*, Oct. 2, 1896, is used for calking, and there is a small emery-wheel run by one of the Baird rotary engines.

(To be continued.)

New Passenger Locomotives for the New York Central & Hudson River Railroad.

The locomotive shown in the accompanying illustration is one of a lot of eight-wheel passenger locomotives recently built by the Schenectady Locomotive Works for the New York Central & Hudson River Railroad. The engines were built from specifications and drawings prepared by Mr. Wm. Buchanan, Superintendent of Motive Power, and although quite similar to those previously designed by Mr. Buchanan, have some features of marked improvement.

The boilers of the new engines have a very large heating and grate surface, an important feature in fast heavy traffic, and one which Mr. Buchanan has always advocated. The driving and truck journals are of large size, while the driving boxes are of solid Magnus metal.

Kind of piston packing	3 rings, cast iron
" " rod packing	U. S. metallic
Size of steam ports	18 in. × 1¼ in.
" exhaust ports	18 in. × 2¾ in.
" bridges "	1¼ in.

Valves.

Kind of slide valves	Richardson balanced
Greatest travel of valves	5½ in.
Outside lap of valves	1 in.
Inside " "	Line and line
Lead of valves in full gear	⅛ in.
Kind of valve stem-packing	U. S. metallic

Wheels, etc.

Diameter of driving wheels outside of tire	78 in.
Material of driving wheel centers	Gun iron
Tire held by	Shrinkage and retaining rings; Material, Midvale steel.
Driving box material	Magnus metal
Diameter and length of driving journals, main crank pin journals,	9 in. diam. × 12½ in.
" " " " side rod crank pin journals,	5½ in. diam. × 5½ in.
	4½ in. diam. × 3½ in.
Engine truck, kind	4-wheel rigid center with spring side bearings.
Engine truck journals (axles, iron)	6¼ in. diam. × 10¼ in.
Diameter of engine truck wheels	33 in.
Kind " " " "	Krupp No 3, with O. H. tire, 2⅝, held by retaining rings.

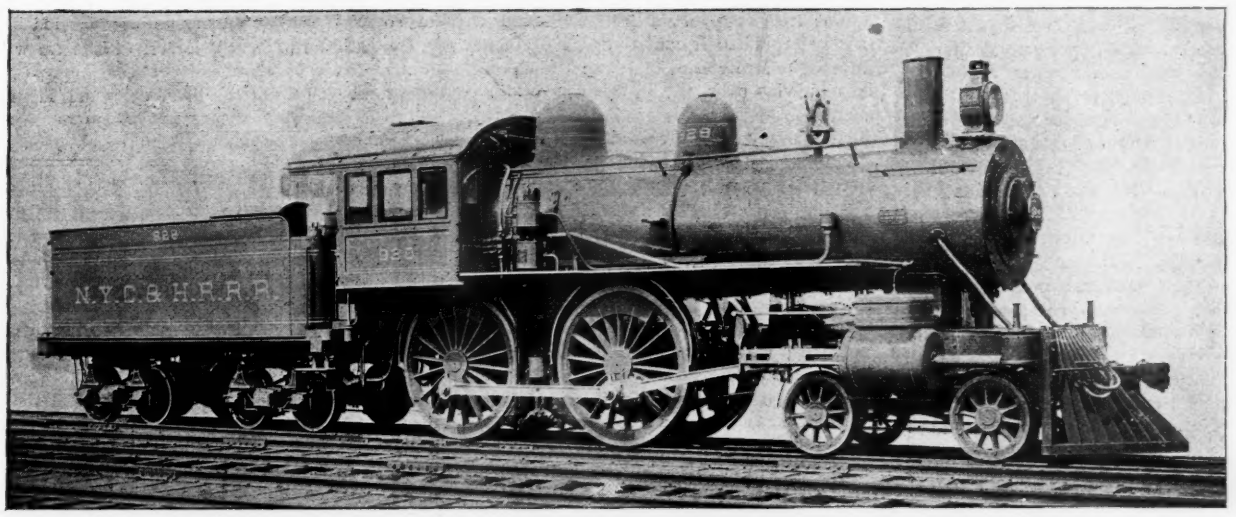
Boiler, etc.

Style	Wagon top
Outside diameter of first ring	60 in.
Working pressure	190 lbs.
Material of barrel and outside of firebox	Carbon steel
Thickness of plates in barrel and outside of firebox,	Throat, ⅝ in.; balance, ⅞ in.
Horizontal seams, butt joint, sextuple riveted with welt strip inside and outside.	
Circumferential seams	Double riveted
Firebox length	103⅜ in.
Firebox, width	40⅜ in.
Firebox, depth	F., 74⅛ in., B., 58⅛ in.
" material	Carbon steel
" plates, thickness, sides,	⅜ in.; back, 11/16 in.; crown, ⅜ in.; tube sheet, ⅞ in.
Firebox, water space	4 in. front, 3 in. sides, 3 to 4½ in. back
" crown staying	5 in. × ¾ in. crown bars, welded at ends
Firebox, staybolts, Brown & Co.'s U. S. iron,	⅝ in. and 1 in. diam.
Tubes, material	Syracuse S. L. W. charcoal iron No. 11 W. G.
" number of	288
" diam	2 in.
" length over tube sheets	12 ft. 1½ in.
Firebrick, supported on	Water tubes

general uses air should be restricted, and where extensions of labor-economizers should be in the direction of another agent, like electricity.

Mr. McConnell has cited some very sensible applications of compressed air and I entirely agree with him until he mentions some uses to which I think compressed air is not well adapted. He mentions having a three-cylinder Brotherhood engine operated by air, which he uses for running an 18 in. slotter, a 42 × 42 in. planer, and for such work as running wheel lathes; and, further, he speaks of the use of an air-engine for running a transfer table of 100 ft. travel. I believe in these instances he is going entirely out of the legitimate field for use of compressed air. At the end of the paper, almost the last paragraph, he speaks of doing away with line shafting entirely. "No main-line shafting extending the entire length of the shop is necessary. A short line shaft may be used for heavy machinery and all the light machinery may be driven by air." There he is treading entirely upon the province of the electric motor, in my opinion I am not able to present now a thoroughly-digested statement of just what the two fields are, but immediately before the meeting I jotted down some general headings of groups under which I think the two agents might severally be used to advantage. In railroad shops compressed air is adapted, First: For short hoists or direct lifting operations, such as jacks, and air hoists for unloading car wheels and for placing heavy weights on lathes and planers. Second: It may be used for pressure tools, or light work like stamping and pumping. Third: It may be used for working a tool for striking short quick light blows, such as riveting and caulking tools for boilers. Fourth: It is adapted to air blast purposes, such as mixing paints and whitewashing. As a fifth use might be mentioned its employment for transferring oils from cars to tanks in oil houses. When these five headings are considered I think we have about got to the end of the catalogue of cases in which air can be used to special advantage, although, of course, there are many other places where it can be used, but not as economically as could some other agency.

Under electric groups I will name, first: That for lifting purposes, such as in traveling cranes; second, for conveying operations, such as in transfer tables and traveling cranes; third, for rotary power tools, which would comprehend the general group of individual motors for running large machine tools, also small special motors adapted for drilling and tapping. This drilling and stay-bolt tapping has been done by air



Eight-Wheel Passenger Locomotive—New York Central & Hudson River Railroad.

Mr. WILLIAM BUCHANAN, *Superintendent of Motive Power.* *Built by the* SCHENECTADY LOCOMOTIVE WORKS.

The driving wheels are cast of gun iron. The piston rods are extended through the front cylinder heads, reducing to a minimum the trouble with wear of cylinders and broken piston rods.

There were 10 engines in the above lot, five of which had drivers 78 in. in diameter, as shown in the illustration, while five were duplicates, except that the drivers were 70 in. diameter.

All these engines are in fast service on the "Empire State Express," the fast mail, and the Chicago, St. Louis and Cincinnati limited trains, and have already made some exceptionally fast time. On Dec. 1, one of the engines, No. 924, made the run with train No. 50, the "Empire State Express," east from Syracuse to Albany, a distance of 147.84 miles, in two hours and 30 minutes, including a three-minute stop at Utica, together with a slow-down going through Schenectady and a slow-down through the streets of Syracuse, about 1½ miles, in compliance with that city's ordinance limiting the speed to eight miles an hour. Deducting 10 minutes for the time in running the 1½ miles in Syracuse, and three minutes for the stop at Utica, the running time from the city limits of Syracuse to Albany was two hours and 17 minutes. Deducting the 1½ miles in Syracuse from the total distance leaves 146.34 miles, which made a speed of 64 miles per hour for that distance, not allowing for the slow-down through Schenectady.

General dimensions of the engines are as follows:

General Dimensions.

Gage	4 ft. 8½ in.
Fuel	Bituminous coal
Weight in working order	136 000 lbs.
" on drivers	90,000 lbs.
Wheel base, driving	8 ft. 6 in.
" " rigid	8 ft. 6 in.
" " total	23 ft. 11 in.

Cylinders.

Diameter of cylinders	19 in.
Stroke of piston	24 in.
Horizontal thickness of piston	5 in.
Diameter of piston rod	3⅝ in.
Material " "	Hammered iron

Heating surface, tubes	1,809.56 sq. ft.
" " water tubes	12.93 sq. ft.
" " firebox	158.23 sq. ft.
Heating surface, total	1,980.72 sq. ft.
Grate surface	30.69 sq. ft.
Grate, style	Rocking, R. R. Co.'s
Ashpan, style	Sectional, dampers front and back
Exhaust pipes	Double
" nozzles	3¾ diam.
Smokestack, inside diam	16 in.
" top above rail	14 ft. 8 in.
Boiler supplied by	Two Monitor injectors No. 10 R. S., No. 9 L. S.

Tender.

Weight, empty	43,220 lbs.
Wheels, number of	8. Kind, Krupp No. 4, with O. H. tire 2⅝ in., held by retaining rings
" diameter	36 in.
Journals, " and length (axles iron)	4½ in. diam. × 8 in.
Wheel base	15 ft. 10½ in.
Tender frame	6½ in. × 4 in. × ¾ in., angle iron
" trucks	Wood bolster, side bearing front and back
Water capacity	4,500 U. S. gals.
Coal	17,000 lbs., 8½ tons
Total wheel base of engine and tender	48 ft. 9½ in.
" length of engine and tender	58 ft. 4⅝ in.

Special Appliances.

Double riveted mud ring.
Two 3-in. Consolidated muffled safety valves.
Westinghouse automatic air-brake on drivers, tender and for train.
Westinghouse air signal, 9½-in. air pump.
Asbestos cement boiler lagging.
Gould pilot and long shank tender coupler.
Water scoop on tender.
Piston rods extended through front cylinder heads.
Nathan No. 9 triple sight-feed lubricators.
Springs made by Schenectady Locomotive Works.
Star round case headlight.
American steel brake beams on tender.
Ross Meehan shoes.

Some of the Uses of Compressed Air.*

Mr. GEO. GIBBS (C., M. & St. P.)—It is not surprising that an air plant has been found a great convenience, and it is only to be regretted that the method of development has led to some economically absurd applications of the power. Such a result could only have been avoided by looking over the ground first, and deciding to what

* Discussion at the Western Railway Club, December meeting, of the paper by Mr. McConnell, read at the November meeting.

tools, but I think it can be done much more satisfactorily by motors, although I confess that I have not seen any motor which has been put on the market which completely fulfills the conditions of the requisite lightness and reliability. The urgent demand for this class of electric tools will, however, doubtless result in their being forthcoming in the near future.

The question of economy, in production of air power, is a difficult one to arrive at for a definite solution. I have not seen any reliable figures for economy of commercial compressors. The question of economy, however, is not the only one to be considered in such cases as this, as convenience and labor-saving results are of much greater importance. In the ordinary shop, where you do away with the labor of one man, you are justified in expending quite a large sum for the plant and a considerable sum for fuel expences in operating it. It has been stated by authorities that the fuel cost in the ordinary shops for all power purposes does not amount to more than one or two per cent. of the labor bill, so that by doubling the fuel cost a very small item only will be added to the shop expense, compared with the saving introduced by increasing the capacity and efficiency of the plant and a possible reduction in the labor bill.

Mr. C. H. QUEREAU (B. & M. R.): Admitting all the economy to be obtained by the use of compressed air in the shops, there is such a thing as carring it too far. One of my friends recently said that he had had some revelations as to the value of labor-saving devices when he came to put his men upon piece-work in repairing locomotives. Most roundhouses are fitted with stack lifts for taking the steam chest covers off and lifting the valve out. When this operation was put on piece-work, a couple of men would take a stick and lift that steam chest off while they could adjust the stack lift. Compressed air is not always economical though it may be a convenience.

Another matter is the lack of the study of economy in compressing air. Although the item of fuel cost may be a small part, a few hundredths per cent. of the expense of a shop, still in the course of a year that small per cent. will amount to a number of dollars, and if we take into consideration not only one, but possibly half a dozen shops, it will be readily seen that it will amount in the course of time to a respectable amount. I was recently visiting a shop of some size where compressed air is used quite extensively and found that the inlet by which the compressor took the air was located at the top of the building where all the heat in the machine

(Continued on page 46.)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Governor Wolcott, of Massachusetts, in his first annual message to the legislature, says; "The frequency of accidents at railroad crossings has rendered necessary some means to prevent them. The method of reaching this result is not clear. The serious menace that surrounds all travelers where highways and railroads cross upon the same plane would justify an inquiry by the legislature, through a commission or otherwise, as to the proper disposition of this question." The main sentiment here expressed is highly commendable; but what does the legislature need to inquire about? The state of Massachusetts made an exhaustive inquiry seven years ago; what new conditions have arisen since then? The very competent special commission of 1889 found that about forty or fifty millions of dollars would be needed to separate the grades at all the highway grade crossings of railroads in the state and that, though there were engineering problems in all the cities and large villages, practically the only difficulty was in finding the money to pay for the work. The state then appropriated $500,000 yearly (maximum) to ease the burden upon the towns and cities and as a consequence Massachusetts has done more in this great improvement than any other state. In spite of the liberal appropriation by the State, which has paid for one-fourth of all the improvements made (spending over $2,000,000 in all thus far) the strife between the municipalities and the railroads has not been wholly done away with, for the railroads aim to have the state money first applied to crossings in country districts, where more of it will go for elevating tracks and less for outside land damages. This may be the specific problem which Governor Wolcott is not clear about; but on the general question Massachusetts seems to be in the most fortunate situation imaginable. What better plan than the present one can be suggested? The apportionment of expense is always a subject of strenuous controversy where the sum is large and two powerful interests have an opportunity to argue, to try persuasion on legislatures and to resort to the courts. It is not likely that these financial puzzles can be better settled by a special commission, to consider the state generally, than by the special commissions of three members which under the present law are appointed by the Superior Court for each crossing to be dealt with. In hard cases like that at Worcester some interest will have to bear a great burden in any event. As long as each side will do its best to delay a conclusion until it is fully satisfied, why not curtail the means of delay by putting additional limitations on the right of appeal?

Not the least interesting of the numerous and varied annual reports and addresses that now flood the newspapers are the deliverances of Messrs. Vanlandingham, Leeds and Wilson, the executive officers of the merchants' freight bureaus at Kansas City, St. Louis and Cincinnati respectively. We print extracts in our traffic columns. The cheerfulness of these documents is about in the order that we have named them, the last one being decidedly gloomy. Indeed, the Cincinnati bureau, according to a recent newspaper statement, is in danger of dissolution for want of support. Possibly Mr. Vanlandingham's more hopeful tone is due to his personal temperament, though the continuous existence of his office for seven years indicates that its usefulness (and the merit of its manager) must be positive. The situation at St. Louis seems to be discouraging all around. It is not to be assumed, however, that, because a shippers' representative makes a big lot of complaints, everything is out of joint. Those things that are running smoothly receive little or no mention in such a report as Mr. Leeds'. It is his business to find what is wrong and attempt to fight it; and possibly he, as others have done in similar situations, finds it necessary to show that a big fight is impending, or will soon be necessary, in order to impress the merchants with the importance of their retaining a competent general; but this may be an uncalled for insinuation. It occurs to us that nearly all the woes described are of a sort which the St. Louis merchants will do well *not* to lie awake nights about. Certainly if so experinced and energetic a man as Mr. Leeds has been working constantly for two or three years to ameliorate them and has not succeeded, there is good ground for classing them as incurable. Our readsre will remember that one of the things now reported as detrimental to St Louis, the change in freight rates to Texas, was made to *favor* one class of St. Louis merchants. Another thing, the establishment of through rates from the grain fields to the eastern markets, which injure the business of St. Louis grain merchants, who are really unnecessary middlemen, is as inevitable as the flow of the Mississippi River toward the Gulf.

It is a pity that the merchants of large cities do not freely support a freight bureau without so closely gaging their contributions of money by the number or importance of definite "victories" that the bureau wins over the railroads. A commissioner should not be compelled to show specific savings to justify every month's salary that he draws. He should be useful and valuable merely as a watchman, to stand constantly on guard for the purpose of preventing friction between the shippers and the railroads. As Mr. Leeds reminds us, the best preventive of war is a thorough preparation for it. Kansas City has pursued a consistent attitude toward the railroads for seven years, and now the merchants assert that they have the respect of the railroads; which must mean real respect, not fear. All railroad officers, so far as we know, except the sharpers, prefer to deal with a commissioner who is familiar with transportation business rather than with a dozen or a hundred merchants who think that they are thoroughly familiar with it, but in reality are only partially so.

Mr. Leeds says that the theory of mutuality of interest and of co-operation is a delusion; that if the merchants try it with the railroads they will come out at the little end of the horn. His views of business morality seem to be a good deal like those of his neighbor, the Hon. John J. Ingalls, on political morality. Ingalls looks upon the decalogue as a back number. But suppose Mr. Leeds tries the opposite plan, of constant and relentless antagonism, does he expect to accomplish anything then? He would be violating his own precept, to employ pure common sense in dealing with the railroads. Mutuality does not mean giving the railroad more than its due; but it does mean to give it its due. That is plain common sense. "We should deal with the railroads according to the ethics employed by them in dealing with each other." We are glad to see this piece of advice; for, although it may be translated by some of Mr. Leeds' constituents to read "fight the devil with fire," in reality it means a constant improvement, for the railroads, in their dealings with each other, have improved their ethical standards very greatly during the past year.

Mr. Wilson puts his advice the other way; he advises the railroads, not the merchants, and tells them that it is for their interest to establish cordial relations with shippers. That is good, but suppose the shipper wants the earth? The lamb had great difficulty in establishing cordial relations with the wolf. The Chicago shipper wants all the earth south of the Ohio River, in addition to what he has now. This is the claim Mr. Wilson is pleading for. We do not know but it would be for the interest of the Queen & Crescent, for instance, to reduce rates for the Chicago shippers; we are not advocating the maintenance of the present rates; but it *is* fair to ask who admits that the present basis is unjust. The alleged injustice is claimed to lie in the lower rates per mile charged on goods from New York; but if the New York goods, after being, at the request of Mr. Wilson, refused by the Queen & Crescent road, were taken to the same destination, say Chattanooga, by the water and rail lines through Virginia, where would Chicago or Cincinnati gain anything?

Mr. Vanlandingham gives the merchants a rather novel piece of advice; he tells them that further legislative regulation of the railroads is *not* needed at present in the Western states. The railroads feel the same way, so we must conclude that here is an instance of mutuality of interest between railroads and shippers. If Mr. Leeds' dictum is sound, this is a marked exception. It is to be hoped that the good advice given to the Kansas City merchants will be passed along to their country friends. In the West the city merchant does not seem to have much direct influence over legislation. The exception noted by Mr. Vanlandingham, that the time for giving notice of advances in rates in Kansas should be changed, is a point well taken. The two essential elements in railroad economy, as the companies are at present situated are very succinctly stated; the roads need all the money they can get, because extensive repairs and improvements are necessary; and there is no danger that they will get too much, for rates will be kept down by circumstances beyond their control. The chief circumstance is the very low price of grain and the superabundance of railroads to compete for the carriage of it. Whatever injustice the railroads of the West may have done to Kansas when they were managed by a generation now dead, there is no danger that they can oppress the state now, or any of its neighbors. Mr. Vanlandingham says "let well enough alone," also, in the matter of national legislation. In this his views will not be so readily accepted by railroad men, especially by those in the West (who are not yet so thoroughly satisfied with their new association as the Eastern roads are with theirs); but from the present attitude of Congress, we judge that it makes little difference what the railroads think about pooling, or what the merchants think either. Everybody must sit down and wait.

Rail Sections and Weights Again.

Dec. 18 we wrote briefly of the progress that is making in increasing the weights of rails and toward the use of standard sections. We are now able to add some interesting information on the same subject.

It may be well to state again some of the information published in that article. It appeared that the Pennsylvania Steel Co. and the Bethlehem Iron Co. had been rolling the American Society sections only to a very limited extent. In fact the Bethlehem Company had made rolls only for the 65-lb. and 75-lb. sections. The Illinois Steel Co., however, reported that 38 per cent. of its entire tonnage is rolled to the sections of the American Society of Civil Engineers. The Lackawanna Iron & Steel Co., in 1896, rolled 5.69 per cent. of its tonnage to those sections. However, it rolled 25.37 per cent. to the Dudley sections and 8.29 to the Hunt sections. That is, 39.35 per cent. of its total output in 1896 was rolled to the modern improved sections, the differences in which are not great as regards service. In them the objects of the movement toward improved and standard sections are accomplished, so far as improvement in the rail goes; but the rail-maker is still obliged to carry rolls for three different sets of standards, although all of these standards are very excellent.

We learn now that the Carnegie Steel Co. is rolling a much larger percentage to the American Society standards than either of the other concerns which have reported. In 1894 13½ per cent. of its total product was rolled to these sections. In 1895 the percentage had risen to 42, and in 1896 it was 59.6, which is a remarkable change to have taken place in so short time. It must be remembered that the final report of the American Society's committee was only made and adopted in the middle of 1893. The Carnegie Company rolled the first rails to these sections in the spring of 1894 for the Chesapeake & Ohio Railway. We are informed that the sections are now used by 28 different railroad companies in the United States and by four in Japan, the names of which appear in a foot-note.* These sections are also used

*Railroads of the United States using American Society of Civil Engineers standard rail sections: Baltimore & Ohio; Baltimore & Ohio Southwestern; Chesapeake & Ohio; Chesapeake, Ohio & Southwestern; Butler & Pittsburgh; Chicago, Burlington & Quincy; Chicago & West Michigan; Cleveland & Marietta; Detroit & Mackinac; Detroit, Lansing & Northern; Grand Rapids & Indiana; Illinois Central; Long Island; Louisville & Nashville; Lake Shore & Michigan Southern; Louisville, New Albany & Chicago; Michigan Central; Memphis & Charleston; New Orleans & Northeastern; Erie; Pittsburg & Lake Erie; Richmond, Fredericksburg & Potomac; San Francisco & San Joaquin Valley; Southern; Texas Midland; Toledo & Ohio Central; Toledo, Ann Arbor & North Michigan; Wabash.

Japanese railroads using the American Society of Civil Engineers' standard sections: Hankaku; Hokuetsu; Nankai; Ota.

in Mexico, by the Rio Grande, Sierra Madre & Pacific.

The record of the struggle for uniform sections, which was carried on for a good many years before 1893 and which was particularly active about 1890 and 1892, is very interesting reading; but we suppose that no great good will be accomplished by renewing that discussion now. We assume that everybody who has considered this subject with any care is now thoroughly satisfied of the importance of using standard sections and of the intrinsic merits of the sections recommended by the Committee of the American Society of Civil Engineers, which embody most of the important ideas so ably and persistently set forth by Messrs. Dudley, Hawks and Hunt for a number of years. We question, however, if many people realize what extravagant confusion of sections prevailed only a few years ago.

In 1880 Holly estimated that rolls were carried by the rail mills for 300 different sections, and Captain Jones said that a rail mill needed a 10-acre lot to hold its rolls. In 1890 we endeavored to ascertain what progress had been made towards uniformity. We found that the investigation was not only difficult and tedious, but that in the nature of things it was almost impossible to find how many sections were still in current use. We did find, however, that four of the great mills were carrying rolls for 29 different weights between 56 and 85 lbs., and that they carried 24 different sections of 60-lb. rails alone. As nearly as we could estimate, rolls were carried by these mills for 108 different sections between 56 and 85 lbs. These, however, were for sections in actual current use; but a good many other sections had to be carried of obsolescent patterns to fill orders for small lots for replacements, etc. These were the facts found, as we say, in four mills. One of the largest mills had no book of sections in print at the time and no doubt its records would have added considerably to the number of sections in use.

The variations in dimensions in sections of the same weight were remarkable for what seems mere triviality. Each designer seemed to delight in introducing odd thirty-seconds and sixty-fourths of an inch. We found such widths of flange as $4\frac{5}{64}$, $5\frac{1}{32}$ and $3_{\text{I}}\frac{5}{16}$ in. One chief engineer who preferred the decimal notation carried out his flange width to five places of decimals, making it 4.04125 in. In the crown radius there was much less variation than in other dimensions. In the 24 sections of 60-lb. rail the range was from $4\frac{1}{2}$ to 12 in. for this dimension. The depth of head from the top of the crown to the intersection of the fishing faces varied from $1\frac{13}{32}$ in. upward, and pretty nearly every 64th of an inch in the range had its advocate.

The variety of weights was not so remarkable for trivialities as the variety of dimensions, but foolish differences abounded. In the 29 different weights between 56 and 85 lbs. we found rails of 58 lbs. per yard, $58\frac{1}{4}$, $58\frac{1}{2}$. We found a series of sections for each half pound from 60 lbs. up to $63\frac{1}{2}$. We found rails of 66 lbs. per yard, $66\frac{1}{2}$, 67, 68, $68\frac{1}{2}$ and 69. Of course the variety of weights and sections rolled to-day is still considerable. We have not made any study to ascertain how great it really is, but it has doubtless been much reduced in the last four or five years.

In the article which we published a month ago we showed the progress in increased weight of rails made by the Illinois Steel Co. In 1889 the average weight per yard of rail rolled by that company was 63.75 lbs.; in 1895 it had risen to 71.08. In 1896 the Lackawanna Iron & Steel Co. rolled 11.86 per cent. of its total production in 100-lb. rails and 20.83 per cent. of its product was 85 lbs. or upward; $73\frac{1}{2}$ per cent. of its total product was above 72 lbs. weight. We learn now from the Carnegie Company that the average weight of rails rolled by that concern has increased from 64.14 lbs. per yard in 1889 to 73.06 in 1896, as shown by the table below.

Weight of Rails by the Carnegie Steel Company.

1889	average	weight	64.14	lbs.	per yard.
1890	"	"	63.50	"	"
1891	"	"	66.50	"	"
1892	"	"	68.60	"	"
1893	"	"	70.83	"	"
1894	"	"	67.83	"	"
1895	"	"	73.80	"	"
1896	"	"	73.06	"	"

Annual Reports.

Brooklyn Elevated.—The annual report of this company for the year ending Dec. 31 is promptly issued with quite full particulars. In this respect it is in decided contrast to the report of the Manhattan Elevated Company, which gives very little information of the company's affairs, and consists in fact of only a four-page circular containing merely a general summary of the yearly earnings and a summarized balance sheet. The present Brooklyn Elevated Company was formed by a consolidation with the Union Elevated, and owns altogether 20 miles of road. Its prineipal line is from the Brooklyn Bridge to Cypress Hills at the city line. Two lines branch off from this, one reaching the southern section of Brooklyn and another Ridgewood in the northeastern section of the city. Another line reaches Fulton Ferry, and is in fact, part of the old main line, the connection with the Brooklyn Bridge, now by far the most important source of traffic to the company, being built at a later period. A line from the Broadway Ferry to a connection with the East New York line completes the system.

The struggle to make financial ends meet has always been desperate and in recent years the deficit has been constantly growing. The topography of Brooklyn does not give the elevated roads the great advantage in the movement of passengers which the New York elevated roads have, the city spreading out like a fan. The mileage is only 16 miles less than the amount operated by the Manhattan road, which has gross earnings nearly six times heavier, and also carries nearly six times as many passengers.

The extensive electric street railroad lines of Brooklyn, which occupy every important street and avenue, have also greatly diminished the revenues of the company. The electric street railroad mileage of Brooklyn is 349 miles and is practically divided between two companies, which, by a system of transfers, facilitate travel to all points of their line and make the street lines generally preferable to the elevated in traveling about the city. In fact the elevated roads have a heavy traffic only during the early morning and evening hours, when they secure a large share of the travel to and from New York. In other portions of the day only two and three-car trains are run, but these are run at close intervals, the officers taking the position, undoubtedly a correct one, that travel can only be attracted and held by a very frequent service.

The results of operation for four years have been as follows:

	1896.	1895.	1894.	1893.
Gross earn...	$1,718,688	$2,082,937	$1,730,848	$1,839,280
Oper. expen..	1,029,989	1,158,233	1,041,098	1,096,913
Net earn...	$688,700	$924,700	$689,754	$742,367
Fixed charges	882,084	889,428	831,093	764,897
Balance....	Def. $193,385	Sur. $35,271	Def. $141,339	$22,530

Fixed charges have been increased by interest in the bonds issued to build short extensions at Cypress Hills, on the southern line, and more especially the loop connection with the Brooklyn Bridge.

The gross earnings in 1896 decreased 9.86 per cent. over the *average* gross earnings of the two years, 1894 and 1895. The average is taken, because 1895 earnings were large from an exceptional cause. Operating expenses show a decrease of 6.33 per cent. from the averages of the two years, net earnings decreased 14.68 per cent. and fixed charges increased 4.35 per cent. The decrease in expenses was largely in motive-power expenses. Maintenance of way and maintenance of car charges both increased, and general expenses also. The transportation expenses show little change from 1894. In 1895 the redution of 10 per cent. in wages paid, made in 1894, was restored. The fixed charges include all state and municipal taxes. The latter, however, have not been paid, the company deeming the amounts excessive. The question is now before the courts for settlement.

The total indebtedness of the company on Dec. 31, is given as $605,000, not including the Brooklyn taxes in litigation. This amount, President Uhlmann, points out has not accrued from the operation of the road. In fact, the company has expended, on its property, $771,000 more than the proceeds of the bonds sold, of which $113,000 was spent in 1896. With the closing of the construction account by the sale of bonds, as originally intended, but which for several years past has been impossible, the company would have in cash, after paying the $605,000 loans, an additional $166,171 applicable to the payment of taxes. The total deficiency of the company from operation, including the large deficit of 1896, on Dec. 31, 1896, is then $182,782, and that amount only can be truly called the floating indebtedness of the company.

A comparison with the results in 1895 would be misleading because in that year the company profited largely by the strike of the employees of the Brooklyn electric railroads, which caused a pretty complete suspension of traffic on those lines for over two months. The Elevated Company benefited to some extent from this throughout the entire year. The statistics of passengers carried, allowing for this, shows a continuous falling off from year to year, although the company has not decreased the train mileage to any extent. The traffic statistics are summarized below:

	1896.	1895.	1894.	1893.
Passengers carried...	32,608,587	40,068,719	33,560,462	35,882,508
Trains run.....	547,212	592,146	552,182	545,802
Train mileage.....	3,228,311	3,639,742	3,316,301	2,976,799
Number of cars run...	1,519,348	1,881,581	1,636,286	1,516,671

The daily average then of passengers carried has varied between 98,308, in 1893; 91,946, in 1894; 109,777, in 1895, and 89,094, in 1896. The falling off in traffic is ascribed by President Uhlmann, to two causes, the "hard times," and the competition of the surface roads in Brooklyn. Just what proportion may be attributed to each of these two causes it is, of course, impossible to determine. It is worth noting, however, that even the travel over the cable railroad of the New York and Brooklyn Bridge showed a considerable falling off in the year to Dec. 1, 1896, but of course much the larger share of the loss to the Elevated Company is due to the competition by the street railroad lines. Rivalry between the two larger of the street railroad companies has greatly increased the number of cars run, and other facilities, which, of course, have further accentuated the losses of the Elevated Company.

For any considerable immediate increase in the company's traffic it must look largely to better arrangements at the New York & Brooklyn Bridge. Its present terminal serves very well, but the plan to run the elevated railroad cars across the bridge, if carried out, will undoubtedly be of substantial benefit. The questions involved in this proposal, mainly whether the operation of the elevated trains and the bridge trains alternately is practicable, is now before a special commission of engineers for report. If their decision is that the bridge is strong enough, and that the cars of the elevated companies can be sent over it, the necessary changes to carry out the plan should be made as promptly as possible. It will of itself be a substantial relief to the present overcrowded facilities of the bridge railroad, relieving its terminal platforms and saving the passengers the tedious climbing of stairs, for half of the passengers over the bridge use the Brooklyn elevated railroads. Another project of importance to the company is the building of a bridge from Broadway, Brooklyn, the terminus of one of its lines, to connect with the elevated lines of New York, which is intended to carrry the trains of the company. These projects, with the growth of Brooklyn and the probable settlement of the excessive competition between the street lines of the city, will inure substantially to the benefit of the Elevated Company.

The Peruvian Corporation.

The affairs of the Peruvian Corporation, Limited, seem to be going steadily from bad to worse, although the recent appointment of Mr. Schatzmann as resident manager in Peru offers some ground for hope of improved administration. The net revenue from all sources for the fiscal year ending June 30 last amounted to only £11,687, which is a rather bad showing for a corporation whose nominal capital is £16,500,00. The seriousness of the situation becomes more apparent when it it is remembered that this capitalization represents the interests of original government bondholders whose claim against Peru amounted to some $260,000,000 gold.

The chief resources of the corporation are the guano monopoly, colonization enterprises based on the grant of 4,940,000 acres of land, the government system of railroads controlled by the corporation for 66 years, and an annual subsidy of $400,000 for 33 years from the state. This latter has not been paid, owing to failure on the part of the corporation to carry out its engagements according to contract.

Traffic on the railroads has increased, so that the earnings have risen from 1,840,008 *soles* in 1890-91 to 3,027,760 *soles* in 1895-96, but meantime the value of the *sol*, following that of silver bullion, has declined from 74 cents to 48 cents. But it is hopeless for the corporation to expect any really important contributions to general revenue from the railroads until further extensions of the lines now open shall have been made, so as to open up the great silver district of Cerro de Pasco, as well as to provide transportation facilities to the region it is endeavoring to colonize. One would suppose that under intelligent management these things could have been accomplished, for the corporation has already expended over $15,000,000 in the construction of only 110 miles of road. The original purpose was to increase the existing lines by an additional 205 miles of track, at an estimated cost of £3,212,000, a little less than has actually been spent on the 110 miles.

Severe strictures have been made upon the corporation's conduct of the guano business, in which avoidable losses of about $1,250,000 have been incurred, part of which, it is hinted, have been in the form of subsidy to political managers, from whom an administration was expected which would deal less strictly according to the letter of the contract with the corporation. As matters stand the government stoutly refuses to extend any gratuity to the corporation, and withholds the annual subsidy until the company fulfills its obligations. Meantime, the £100 shares of the company go begging at £2 5s., and the first-mortgage bonds, of which £3,700,000 have been issued up to date, with a face value of £100 bearing six per cent., are quoted at only £39.

Unless Mr. Schatzmann proves to be a man of unusual ability, capable of maintaining cordial relations with the government of restraining the company from a perpetuation of its past errors, and of introducing sound economical reforms in the management of the vast enterprises under his charge, a catastrophe is sure to follow, and the rumors now rife of an impending revolution and of possible diplomatic coercion by Great Britain show how serious such a catastrophe might be.

By a decisive majority, 66 in a total vote of 270, the House of Representatives voted down the Pacific Railroad refunding bill and the government loses a chance to effect a fair compromise of the Pacific Railroad subsidy debt. The defeated measure was but one of many similar bills which have been pressed upon Congress in recent years by the maturing of this indebtedness and the desirability of settling it one way or another. The provisions of the bill protected the government's interest in the road, extending the debt at two per cent. interest with additional security. Briefly provision was made for the settlement of the $112,000,000 of indebtedness of the Union Pacific and Central Pacific on the basis of an extension of over 80 years, at two per cent., with an annual extinguishing payment on the principal at the

rate of $365,000 for the first 10 years, $580,000 for the second 10 years and $755,000 for the remaining years. The settlement proposed was equitable also to the companies, and within their financial abilities. It was useless, however, to expect that Congress would look upon the matter in a business-like way and attempt to carry out an intelligent plan. Politics, of course, was the ruling consideration; greivances were a more potent consideration than duty. Foolish and impotent desires to reach the dead, as if long past wrong could be rectified by any present action, counted for more than putting a great line of transportation on a solid and stable basis, to enable it to give the best and cheapest service, to the great territory it serves, with the least possible complications. What the outcome will be is mere conjecture. Further action rests entirely in the hands of the President. Undoubtedly some definite plan of action has been matured. He promised prompt action on his part, in his recent message, if Congress did not act upon some plan of settlement. We can be almost sure that the President will not consent to the government paying off the first mortgage bonds and undertaking the operation of the road. The most likely plan is that the government claim will be foreclosed, and the road purchased in the interest of the first mortgage bondholders, who already have foreclosure suits in the courts. The point of interest will be the sum which will be needed to buy in the property. A plan has already been promulgated on behalf of the security holders, providing for such a purchase, at about the amount of the principal of the debt due the government. This is about $33,000,000, and that is the amount provided in the bondholders' plan. But nearly $20,000,000 of interest is also due, and if the Government could have the upset price for the property fixed at a sum to equal both principal and interest, there would be a very different set of conditions to face. The financial arrangements which have been made to purchase at the lower figure would then be inadequate. But until the President acts, the whole matter is speculation.

Everybody who knows much about steel rails knows the name of John Brown. It was John Brown, of Sheffield, who rolled Ashbel Welch's first section of steel rails, which section set the fashion for years in the United States, and it was the perception of the fact that the old "John Brown" rail actually wore better than the much heavier rails rolled to the Chanute section that started students on the line of investigation which resulted in the modern section developed on the lines of Dudley, Hunt and Hawks. Brown was knighted in 1867, and as Sir John Brown he died at his home in Kent, on Dec. 27. Brown was born in 1816, his father being a man in humble circumstances. As a boy, he was apprenticed to a company in the steel trade in Sheffield, which company added to its trade the manufacture of files and table cutlery. When his apprenticeship expired his father presented him with a suit of clothes and a sovereign, which was the only material capital with which he started. He borrowed £500, however, and started in the cutlery business, but shortly began making steel. In 1848 he invented the conical steel-buffer spring for railroad cars, which was very profitable. After this his business increased with great rapidity, and he built spring shops and converting furnaces, and soon found himself the employer of a thousand workmen. He was a pioneer in various ways and was the first to introduce the business of making iron into South Yorkshire, where he began the manufacture of wrought iron to be converted into steel. He set up six puddling furnaces and the plant increased rapidly. He began thus the Yorkshire industry in iron for boilers and bridge plates. Brown was also a pioneer in the production of Bessemer steel. Bessemer said that Brown, who was his next-door neighbor, was the first man to look into the possibilities of this process, and he agreed to pay to Bessemer a royalty of £1 per ton for rails and £2 a ton for steel for other purposes made by him under the Bessemer processes. For years he carried on a large business in rail making, but in 1860 his attention was accidentally turned to the possibility of making armor for ships, and he immediately built a rolling mill by which he was convinced that he could roll a plate that would be superior to a hammered one. His first product was a plate 4½ in. thick. This was the beginning of the work which made the Atlas mills famous, and these mills are now among the largest concerns in Great Britain. He was a man of public spirit and generosity, and was loved and honored by his work people, his neighbors and his countrymen in general.

An Indianapolis paper reports that the "Indiana Legislature will try to do away with the car stove and require all railroads to heat their cars by steam from the locomotive. The car of President Woodford caught fire, it is stated, while attached to a train, from a stove. A car is liable to be set on fire from the heater at any time. In the event of a wreck in many instances the people would escape injury but for fire. This is particularly true in postal cars." How much this reporter knows about the intentions of the members of the legislature we are unable to say; but if individual heaters are still used on passenger trains in the state it is no wonder that a law is proposed. The Indiana lawmakers will, very likely, reproach themselves for being 10 years behind the times (other states having ostracized the car stove about that far back) and pass a law at once. It must be that many trains running in Indiana are already equipped for continuous heating, and at first thought one wonders why a law should be necessary; but perhaps Indiana is in the same situation as Iowa. From that state, recently, came the following press despatch:

CARSON, IA., Jan. 5.—A passenger train on the Carson branch of the Chicago, Burlington & Quincy road was wrecked near here this morning. The rear coach left the rails while passing over a trestle and dropped to the bottom of a ravine. It took fire from the stove and was destroyed. By hard work the trainmen and uninjured passengers rescued the injured and prevented loss of life by fire, though some passengers may yet die. (Two passengers and the express messenger were probably fatally injured; two others less seriously hurt.)

In speaking on the subject of car heating on Oct. 30 and Jan. 1 we referred more particularly to the railroads of the South; but Iowa is not in the South, and perhaps we ought to apologize for emphasizing the territorial element overmuch. Moreover, the road whose passengers barely escaped fire at Carson carries thousands of passengers daily into Chicago.

It is one of the great advantages of our system of federated states that we can localize the most acute of our political maladies. Thus the disease can run its course and cause much local misery and yet produce no really dangerous general results. Over and over again this has happened in our history; political and social cranks have worked out their theories within state boundaries and furnished a warning to the nation and done but little harm except to the people directly affected by their experiments. The populist attack now raging in Kansas is a case in point. The active-minded people of that state seem to be bent upon demonstrating in practice the effects of a social revolution upon the prosperity and happiness of a community. The annual message of the governor of the state is full of ignorance of the experience of humanity and of contempt for the opinion of the civilized world. But to us his views on railroads are of the most immediate interest. He attacks the Interstate Commerce Commission as a "subterfuge for justice." He recommends a maximum freight law, and that the Board of Railroad Commissioners be vested with the powers of a court and given the power to adjust fares and freight rates within the state. To overcome the ineqalities in interstate commerce suffered by the state, he advises the people of Kansas to seek for justice out of court. This he thought would be found if the states west of the Mississippi River build a road of their own to tidewater by the shortest and most direct route. "If the states of Texas and Nebraska would join us in the building of a line to Galveston, the expense of building a road would be merely nominal when compared with the vast sums of money that would be saved to the citizens of these states by the lowering of rates."

The Intercontinental Railroad Commission is now applying to Congress for a small appropriation to enable it to publish a final report. This will contain the full reports of the explorations made by the several parties of engineers, who went to Central and South America for the Commission, and their maps. It seems most desirable that a sufficient sum should be appropriated to publish these reports. The engineers were competently led, each party well organized, and the information which they gathered would be useful, if made available, quite apart from any great north and south railroad idea. The scheme of a great intercontinental railroad was one of the impracticable proposals of the amusing Pan-American Congress, which met at Washington in 1890, and we have several times had occasion to point out its absurdity. There is no possibility of such a scheme being carried out. To undertake to build such a line, now, would be a willful waste of public money, and of course the building of the line was urged as a government undertaking. No one was quite so foolish as to suggest that private capital would have anything to do with it But the information collected at such cost ought now to be put in such shape that it can be preserved and used, not only for other and more practicable enterprises, but to prevent further waste in similar schemes.

Some of the Uses of Compressed Air.

(*Continued from page* 43.)

shop was gathered. Any one who has studied the matter of air compression knows that that is false economy.

Another matter which should have more attention is the reheating of the air at the point of use. The efficiency of compressed air can be approximately doubled by heating it in a simple manner by gasoline or any other method for obtaining heat Thee hundred or 350 deg. is a practicable temperature which may be obtained and handled without difficulty.

Mr. J. F. DEEMS (C. B., & Q.): We had been introducing pneumatic and other labor-saving devices around the shops and were inclined to show them off with a good deal of satisfaction when our neighbors came around, and we felt that we were keeping pretty well to the front in this line. One day I happened to see an article in one of the technical journals reciting the experience of one of the large English roads. It appeared that this road had gone to a great expense in fitting up one of its large freight houses in London with appliances for handling freight. It was finally decided to introduce the piece work system in handling freight, and the workmen, who were getting paid for the actual work done, didn't care to use improved machinery, when they knew that its use meant a loss of time and money to them instead of to the company, no matter if it was a little easier for them. At about this time we began to introduce piece work into one of our round houses and locomotive repair shops and you can imagine my surprise, when I found some of the tools which we had looked upon as the very best, cast into the corner and not used at all. But I venture to say that to-day there are many lathes or other machine tools supplied with air hoists where time is continually wasted in getting such hoists into position and making hitches to raise work into the machines which could be lifted into place with one hand in half the time it takes to make the hitch. The same is true of apparatus that I have seen used in car repair yards for lifting draw bars into position. It would take more time to get the machine to the point where it was to be used and get the draw bar into position on the machine than it would to get it into place on the car with the old-fashioned "armstrong" method.

One of the best ways to bring out these points is to adopt some plan by which they are paid for the work actually performed, and perhaps the best method at the present time to accomplish this is by the introduction of piece work. I believe that if the same amount of time and energy had been expended during the past four or five years in introducing and perfecting this or some other better method of handling men, that has been spent in getting up novel machinery for the men to use in handling the work, the results would have been much more satisfactory from a financial standpoint. If there was the same spirit of rivalry between shop foremen to display their business ability in handling their shops that there is to display their mechanical skill in getting up these complicated devices, the result in my opinion would be a net gain. The foreman who succeeds in establishing some system that at all times brings out to their fullest extent the mental and physical powers of every subordinate will have succeeded in designing a special appliance of more value to railroad companies than any other.

Another phase of this question is the desire which seems to prevail in some quarters to operate some of the attachments of locomotives by compressed air that can be operated just as well and much more cheaply by hand.

Mr. B. W. THURTELL (Consulting Engineer): A speaker has mentioned re-heating air as being economical. At Iron Mountain, Mich., there is an immense compressed air plant operated by water power, in which the air is carried up over the hills several miles to the Chapin and Ludington Iron Mines, where it is used to run a Bullock-Corliss engine at the mines. There are used for hoisting ore, and air is also used for pumping from the mines by means of ordinary pumps. In using air to run the engines it is cut off, getting the benefit of expansion as in using steam. A side pipe is attached to the cylinder in which check valves are placed, and the pipe is connected to a steam boiler, admitting a small jet of steam. By this means the air is re-heated a little; if this steam was not admitted, the exhaust pipe would freeze solid where it comes in contact with the atmosphere. Where we use compressed air we should secure the benefit by expansion in the cylinder the same as if steam was used, taking advantage of the automatic cut-off. In transmitting air to hoists, riveting machines, caulking machines, drills, etc., air can be carried greater distances than steam, the only loss being due to friction, supposing the pipes to be absolutely tight. In carrying steam long distances the loss is enormous by condensation and radiation.

Mr. THOS SYMINGTON (Richmond Locomotive Works): While Mr. McConnell was here last week I had a talk with him about his paper and he made an estimate as to what his appliances saved in his shops at Omaha. He estimates that he saves $10,000 a year by the use of his various appliances. We have spent a great deal of money in Richmond on air machinery, and we believe that pneumatic transmission has come to stay. While the field is to some extent limited, yet the uses of compressed air are certainly not few. We use it very successfully with hoists, and we find that in our boiler shops, where we could build only three boilers a week without the air for tapping the staybolts and screwing in the staybolts, we can now build four boilers a week by the use of a very few of these air machines. We have also used air for blowing out cylinders and cleaning the castings, and find it very efficient.

There is one thing about the air machine that we have about decided, and that is that any machine with a rotary piston will not last properly. We have tried every one that is in the market and have not found one that will not give a great deal of trouble and be more trouble than it is worth. Mr. McConnell told me that he had gotten up a three-cylinder air machine weighing 28 lbs., which will develop five horse power with compressed air. That is impossible to accomplish with any other form of motive power. I understand for the same power electricity will require very much increased weight. Twenty-eight to 30 lbs. is about as much weight as a man can handle in tapping out staybolts and screwing in the bolts, so we are now thinking of getting up a three-cylinder piston machine for doing this work and we believe that wherever air is used with a reciprocating piston that it can be used economically. Mr. McConnell further told me that he found that with one of his reciprocating piston machines he could develop power enough to drive a staybolt tap with the exhaust from the rotary machines. It has been confirmed by experience that the rotary is very wasteful.

Mr. J. E. SAGUE (Schenectady Locomotive Works): We have been using compressed air quite extensively, and in a general way like that spoken of by Mr. Symington. We use it largely for hoists and for that work find it very economical. As almost all our work is paid for on the piece-work plan, we do not find the men using the air hoists to handle parts which can be easily lifted by hand, and no hoists are put up at machines for which the work to be handled is light. We find for much of our work, in which the choice can be made between a rotary air machine and the electric motor, that the electric motor promises better than the rotary, because it gives more power and does not cost so much to run. The rotary machine is apt to stick and is extravagant in the use of air. The electric motor has one disadvantage, however, which is the increased weight and space occupied. In our work where it is necessary to put an engine through the shop in the minimum of time, we are obliged to have a good many men working around a boiler or around an engine at once, and any machine which takes up considerable space is under disadvantage. We, therefore, find our men generally opposed at the start to the introduction of compressed air or electricity where it competes with hand labor in such operations as drilling, reaming and tapping, and one reason is that the machines are in the way to some extent when a number of men are working around an engine together.

MR. E. M. HERR (C. & N. W.): I think that I shall have to take exception to the last paragraph but one in the paper, in which it is stated that a short line shaft may be used for heavy machinery, and all the light machinery

may be driven by air. This looks, I take it, to the installation of air motors in machine shops. As many electric motors are being installed in various places throughout the country, and with good economy, I am inclined to doubt very seriously whether the air motor is adapted for this service. I say this because it seems to me that the experience thus far had with air motors shows that they are not nearly as efficient, and I doubt very much whether the outlook ahead would indicate that they can be made nearly as efficient as electric motors as a means of transferring energy from central stations to detached motors.

In France compressed air has been used as a means of transmitting power probably to a greater extent than in any other country. In looking up the matter of experience with the use of compressed air in motors in that country I found some data which throw a little light upon what it costs to run motors which had been developed to a pretty high state of efficiency. In small rotary engines, in Paris, it was found by careful tests (I quote from Kent's Handbook) that as high as 2,330 cu. ft. of air per brake horse-power per hour were used. This, of course, is probably a large figure for very efficient machines, but I do not doubt that many machines used to-day in machine shops for the purpose of tapping and drilling holes will show fully as large a consumption of air per horse power developed in the small motors. In very small motors usually used for running sewing machines, developing about one-tenth horse power, the best performance is 1,377 cu. ft. of free air per horse-power hour at 384 revolutions. The best performance in a 5 H. P. rotary engine with air reheated to 356 deg. Fahr., running at 350 revolutions, is 791 cu. ft. per horse-power hour. The ordinary practice with high-class, well-designed motors shows a consumption of about 1,200 cu. ft. air per horse-power per hour when furnished at 50 to 60 lbs. per square inch in pressure.

From tests recently made on a high-class compressor, with Corliss valve gear and compound air cylinders, with an inter-cooling attachment between the cylinders, I am led to believe that with steam at 80 lbs. pressure and the machine running at 75 revolutions per minute it is about all that ought to be expected to get that air for an expenditure of 30 lbs. of water per horse-power per hour; that is, per horse-power per hour developed in the steam cylinder, when we use the air in motors, that will give as good an efficiency as 1,200 cu. ft. per horse-power per hour. The efficiency of the transmission from the steam engine to the motor will be about 25 per cent., as it required 1 H. P. to produce 300 cu. ft. of compressed air per hour. This efficiency is, of course, obtained without heating the air. If air is reheated it is possible perhaps to raise that efficiency as high as 40 per cent, and possibly a little higher than that. I have some information that as high an efficiency of transmission as 60 per cent. with air motors has been obtained, but I think it is rather doubtful. The ordinary efficiency will run far below that. Of course this seems like a very small efficiency for transmission of power. The gentleman who spoke recently said that if we are getting only 80 per cent. we are doing pretty poorly. It is absolutely impossible to get 80 per cent. with the use of compressed air without reheating it, and it is very doubtful if we can get anything like that, even with the air reheated and very best practice in compressing.

Of course, the efficiency increases as the pressure of the compressed air increases, and at the present time, as you probably all know, experiments on a large scale are in progress for the use of compressed air in street cars, in competition with electricity, and with some promise of success. This case is a little different from the transmission of energy from a central plant to be used in motors installed in the works. The advantage of compressed air in the street car is that there is no line loss. There is considerable loss in electricity on account of having to carry it on the line. Without the reheating, I do not think that any one would consider for a minute the use of compressed air in competition with electricity. Of course, in many applications of compressed air to shop practice, it is practically impossible to reheat the air. I do not mean to say that this is an argument against the use of compressed air in repair shops. I am very greatly in favor of using compressed air in repair shops; I think it is productive of economy, but it is productive of economy when it is compared with hand labor and not generally when it is compared with the most efficient means of transmitting energy. I do not believe that it can compare with efficient transmission of electrical energy for use in running line shafting and operating detached machine tools and uses of that kind.

In the discussion one of the members spoke of the economy of using large units in the compression of air. I take rather a different view of this. I think it is possible to effect economies in the use of compressed air by installing not large, but on the contrary small units. My idea is this, that if you install an air compressor that is too large for the work it has to do, as a rule it is run at less than its highest efficiency and highest economy, and that is not operating with the same economy in coal per horse-power per hour as it would if run at an economical point. My idea would be to install a compressor that it is perhaps not much larger when run at its most economical cut-off than the necessities of the case require, and when the need of more air occurs, to install another unit, not perhaps as high a class of compressor as the first one. The first compressor will then be running all the time; it should be a high class compressor, operating with the most economy, producing the air at the least cost per horse-power per hour, and should be supplemented by a cheaper compressor that would run only when an extra supply of air is needed, and in the interim be shut down and of course costing nothing for operation.

Compressed air is advantageous about a railroad shop for another reason; in this it differs from electricity and has an advantage over it; that is, that when the storage is not being drawn upon the plant can be shut down absolutely and still the reservoir with the power is at hand at all times for use. This is of great advantage in places where but a small amount of compressed air is used and used occasionally.

Mr. F. A. DELANO (C., B. & Q.): One of the uses to which compressed air has been put in recent years is the operation of switches and signals. We have such a plant in Chicago, a modern plant in every respect, and including one of the best types of compressors made, and the air is conducted through a 2-in. pipe for a distance of four or five miles, the compressing plant being about midway between the extreme ends. One of the difficulties we encountered when we first began operating the plant was from condensation in the pipes. This occurred principally in warm days in the winter, when the outdoor air was warm and moist and held more moisture than the temperature of the ground would permit; the consequence was that so long as this air was compressed in the pipes it would form a sort of snow inside the pipes and gradually clog them up. Since that time we have found that by putting in frequent testing stations we can avoid all trouble by blowing out the pipes occasionally, but this condensation is so considerable under some circumstances that it certainly adds much to the expense of such a system of power transmission. Another difficulty which theory would indicate is all wrong is that we have to cool the air as much as possible before we use it; that is, we pump the air through several cylinders which are exposed outdoors before transmitting it through the pipes in order to condense the moisture as much as possible before using it; hence, as we have no means of reheating it before we actually use it to move the switches or signals, it would seem as though we were doing something which was very uneconomical.

Mr. WILLIAM FORSYTH (C., B. & Q.): I have been requested by the Secretary to describe an air compressor which was built under the direction of our master mechanic at Aurora and the principal merit of which is the low first cost compared with its capacity. The air cylinder of the compressor was attached tandem to a large Corliss engine and its capacity is 320 cu. ft. of free air per minute and its cost was less than $300, so that the air compressor cost us less than $1 per cubic ft. of free air delivered. The Corliss engine has 18×48 double cylinders, and the air cylinder is 10 in. in diameter and of course has a 4-ft. stroke. The engine makes 75 revolutions a minute, so that there are 150 strokes per minute, or 600 ft. per minute piston speed. That is probably twice as high as a good air compressor should run and we are thus running at that disadvantage. To see how the efficiency of this compressor would compare with others, we can take up the four sources of loss in air compressors and see what losses there are in this one. The first is loss by friction. We have in this design the minimum of friction, because we have the fewest parts We have 1 piston and 1 piston rod, while almost any other type of air compressor of equal capacity is likely to have 4 cylinders with 4 pistons and 4 piston rods, with all the friction connected with them, beside the journal friction connected with the fly-wheel shaft. In that we have our principal advantage in this compressor. The second source of loss is that due to the increase in the temperature of the inlet air. We tried to minimize this by a water jacket and keep the cylinder cool by running water around it constantly. The third source of loss is that of heat due to compression, and our only way of avoiding that loss would be to put another air cylinder on the end of the other steam cylinder and connecting a cooling chamber between. The fourth loss is due to waste space and clearance. In that we have done the best that we could by putting the valves as close up to the end of the stroke as possible. It would have been better perhaps if the valves had been in the cylinder head, but it is so close to the steam cylinder end that we could not arrange it in that way. We have indicated the engine with the air compressor free, and also when it was compressing air to 80 lbs. and found that it required 40 H. P. We get a horse-power with the Corliss engine with 4¼ lbs. of coal per hour and the air compressor consumes 204 lbs. of coal per hour, and at $3 a ton the cost of 1,000 cu. ft. of free air compressed to 80 lbs. is 10 cents. With coal at $1.50 per ton it is of course only 5 cents per 1,000 cu. ft. I have a photograph of the cylinder here and blue-print drawing also.

Referring to the paper under discussion, I would also take exception to one of the suggestions in the latter part of the paper relating to the use of compressed air for furnace blast and for forge fires. That is probably the most expensive application of compressed air that I have heard of, and it costs at least 10 times as much to produce blast in that way as it would with a fan, and this brings us to the wastefulness of the application of compressed air. I believe that this is the next thing that we must go after, and that there is a larger field perhaps in effecting economy in getting efficient tools to use for the application of compressed air than there is in perfecting any further the air compressors. This will be readily appreciated when we remember that if we have an air leak from an 80 lb. pressure through a hole ¼ in. in diameter it will use up more than a 10-H. P. compressor can deliver. Now in going through the shop the other day I noticed that one of the apprentice boys had a hose connected to the air pipe and he was blowing the chips out of the hole he was drilling in cast iron, and the power used in getting those chips out was a great deal more than would be required to drive the drill press and boy too. And that is only an illustration of the tendency to waste all through the shop. You will find in the summer time that the men have pipes of that kind where they are cooling themselves with an air blast, and the small holes all about the shops, leakages in the pipes, will use up a great many horse-power of compressed air.

Mr. SYMINGTON: I would like to ask Mr. Forsyth how with the Corliss steam engine he can get a varying supply of air in the compressor?

Mr. FORSYTH: We have a regulator which we bought from one of the air compressor companies.

Mr. WILLIAM A. PARKER (Ingersoll-Sergeant Drill Co.): We have gone on in the improvement and manufacture of compressors until we can confidently say that with a four-stage compressor, with the Corliss valve gear, compound condensing type, we can produce 1,000 cu. ft. of free air compressed to 1,000 lbs. for less than 2½ cents. This is by actual test. There are tests going on to-day in the city of New York with a four-stage compressor which will in a short time be completed, and then we shall have authentic figures for compressing air to 1,000 lbs. and over per square inch.

I think we can safely say that with compressors of the straight line type, with the common Meyer valve with adjustable cut-off, that we can produce compressed air, with coal at about $3 per ton or less, for less than four cents for a 1,000 cu. ft. of free air compressed to 100 lbs. This includes all expenses of operation and interest on investment.

Great advances are being made in the shops of manufacturers, looking towards improvements in air compressors. An important feature is an air cylinder thoroughly water jacketed, both body and heads. Small clearances are also of great importance. This has been reduced to a minimum of less than one-half of one per cent. By a concentrated inlet the air should be drawn from wherever it is coolest, driest and freest from dust and impurities, from a basement if possible, where the air will be 60 deg., or below, in temperature. We all know that the temperature of an engine-room is often 70 deg., and sometimee 80 deg., and we lose volume by taking heated air into the compressor.

Mr. J. F. LEWIS (Rand Drill Company): There is a great increase of efficiency in reheating the air before it enters the working cylinder. Of course it costs something to do this, but the cost is very small compared with the increased efficiency. This has been demonstrated in using compressed air for street car propulsion. During an experiment the cars were run about 40,000 miles. The air was carried in storage tanks at from 600 to 800 lbs. pressure, being passed through water-heated to 360 deg. to a reducing valve and direct to the working cylinders, where it was used at from 50 to 150 lbs. pressure, according to the grades or the condition of the track. It was found that the cars could be run 8 to 10 miles when the air was reheated, and only four to five with cold air. This was known as the Mekarski system, which has been used successfully in Nantes for the last eight or nine years, and three years ago three street car lines were established in Paris under the same system. They carry the air at a pressure of between 1,100 and 1,200 lbs, reducing it to the proper pressure when used. We have also made experiments in our shops, which convinced us that it produced much better results by being used hot. In Paris, where air is carried about the city for power purposes by what means is known as the Popp system, an efficiency of 92 per cent. is claimed with heated air, as against 70 to 72 per cent. not heated, and it is believed to pay well to reheat.

I have a letter from Mr. George W. Smith, Master Mechanic of the A., T. & S. F., Topeka, Kan., in which is given data in regard to the cost of compressing air used in the shops at that point, which gives the following:

Steam pressure, 80 lbs.
Air pressure, 100 lbs.
Tons of coal of 2,000 lbs. per month, 155.
Cost of coal per month, $139.50.
Cost of coal per ton, 90 cts.
Amount of free air per minute, 1,712 cu. ft.
Amount of free air per day of 10 hours, 1,027,584 cu. ft.
Amount of free air per month of 31 days, 31,855,104 cu. ft.
Revolutions per minute, 50.
Pounds of coal per 1,000 ft. of free air, 9 7.
Cost per 1,000 ft. of free air, .00137 c.

This compressor is fitted with Meyer adjustable steam valves, compound air cylinders with mechanical air valves on the low-pressure cylinders. Air is taken from outside the engine-room. The above cost is for fuel only; for the air delivered from the compressor, that is the cost of oil, labor and interest on cost of plant, is not considered. The steam cylinders are 20 × 48 in.; air cylinders 28 in. and 16 × 48 in.; H. P., 310.

I will say in connection with this, that there are five miles or over of piping through these shops and yards, in which compressed air is carried to the different tools. As to the saving over the old way, Mr. Smith says:

With the 10-ft. reach, stationary riveting machine we can drive 2,000 rivets per day of 10 hours, with three laborers at a total cost of $4.75 per day. This compared with hand labor three men, total $7 per day, will drive 200 rivets. The 6-ft. riveter, the combination flange punch and riveting machine and the bridge and girder riveter will each average about the same as the 10-ft. reach riveter. The truck riveters, one machine operated by two laborers at a total cost of $3 per day, drive 3,000 rivets in a day of 10 hours; as compared with hand laber, three men at a total of $5 in the same class of work who will only drive 175 rivets. The frame riveter will average about the same as the truck riveter. The staybolt breaker will make an average saving of $8 a day. The tank riveter will make an average saving of $10 a day. The mud rinriveter will drive as many rivets as can be handed to it, and will make a saving of from $12 to $15 a day for that class of work. Not only does it make a great saving, but it insures every rivet hole being entirely filled and insures tight work, while a large per cent. of hand-driven rivets in mud rings invariably leak and have to be caulked or fullered. The staybolt cutter will do the work of 15 men; this looks rather fishy, but it is a fact. You have seen this machine work, and it will very easily cut off 1,500 bolts an hour, while when cutting them off by the old method of hand hammer and chisel you must agree that progress is very slow and that it is hard work. The rotary tapping and drilling machine will do the work of six men. The rotary grinder saves the work of six men. The rotary saw for sawing car roofs saves the work of four men. The pneumatic hammer will save the work of three men. A rail saw saves the work of two men. A rail drill saves two men. The device for operating transfer table saves $6 per day. The machine for revolving driving wheels for setting valves saves the labor of two men. The device for shearing bolts saves the labor of three men. Thirty hoists in various parts of shops save the labor of 10 men at $1.50 per day. Apparatus for loading and unloading oil at the storehouse saves $6 per day over the old method. A jack for pulling down car draft sills saves $10 per day. A device for fitting up hose couplings over the old method saves $15 per day. With the pneumatic painting machine, one man does the work of 10 using hand brushes. The machine for tearing down old car roofs saves $8 per day. A jack for raising and lowering freight and passenger cars makes an average saving of three men. The drop pit makes an average saving of two men. The device for sanding engines saves one man The shifter for switching cars in shop yard saves $50 per week. The coal cleaning device saves 10 men. The flue-roller makes a saving of two men over the old method. The whitewashing machine will do the work of 10 men with brushes.

In another case where the work is different and coal higher, air being used for raising water from deep wells, we have the following conditions:

Steam-pressure, 80 lbs.
Air-pressure, 68 lbs.
Tons of coal of 2,000 lbs., per month, 106¾.
Cost of coal per month, $107.60.
Cost of coal per ton, $1.57.
Amount of free air per minute, 352.8 cu. ft.
Amount of free air per day of 24 hours, 508,032 cu. ft.
Amount of free air per month, 15,748,992 cu. ft.
Revolutions per minute, 45.
Pounds of coal per 1,000 ft. of free air, 13.5.
Cost per 1,000 ft. of free air, .0106c.
Amount of water pumped, 76,256,000 gals.
Cost per 1,000 gals., $ 002.

The compressor is fitted with Meyer adjustable steam valves; the steam cylinders are 14 in. in diameter by 24-in. stroke. The air cylinders are simple, 14 in. × 22 in., and are fitted with mechanical air valves, the air being taken from outside of the engine-room. The above cost is of the air delivered from the compressor for fuel only; that is, the cost of oil, labor and interest on plant are not considered.

MR. J. N. BARR (C. M. & St. P.): After what I have heard about air, I think that it is far ahead of electricity. I have a living example of that. I know that the air flue roller expander saves two men. I had an experience the other day with an electric flue roller. We put one in operation; it was recommended to me as very economical, and I was walking through the shops and thought I would look at it specially. As I went about I saw that one man was standing at the switchboard, another was steadying the motor, another was holding the roller in the front end, and there were five men on the work altogether.

One of our roundhouse foremen got up a very ingenious device. He had a sort of crane about 8 ft. high, fastened into a socket which he would fasten to the side of an engine whereby one man could lift off a steam chest. I went into the shop one day, and a gang wanted to lift off a steam chest casing, that was all, and three men put that apparatus up and lifted the casing off. That is all that they did with it. I was a little out of humor, and I ordered the thing put on the scrap pile. This is to illustrate the importance of drawing a line between what are sensible and practical applications of compressed air and what are foolish, and I am a little inclined to think from some things I have seen and heard that a great many of us are getting into applications that verge on that order.

When compressed air begins to compete with electricity as a rotary agent, I feel inclined to think that it is tackling a problem in which it is coming out second best. It looks to me now that for rotary motion and continuous work compressed air is going to have a very hard time maintaining itself beside electricity. The development of both at the present time is comparatively new, and that opinion may, when you look at it a few years hence, sound like arrant nonsense. However, it remains to be seen.

I note the remarks that the production or compression

of 1,000 cu. ft. of air to 100 lbs. is as low as one cent. The statement was that the cost of compressing 1,000 cu. ft. of free air to 100 lbs. pressure was one cent. Does that include fuel, attendance and repairs?

Mr. LEWIS: That means fuel only. The attendance, and oil and waste, I suppose, would just about double the cost. This was not given, however, because the maintenance included the use of other machinery in the same room.

Mr. BARR: What I wanted was to have that fact definitely presented, that the word "cost" of producing or compressing 1,000 cu. ft. of free air to 100 lbs. pressure at one cent, meant the cost of the fuel at about $1.50 per ton. Now there are many costs beside that in connection with the fuel. I would like to know from some one that is using it, what the cost of rubber hose is in a system of that kind; say a plant that has five miles of pipe and compressors that operate quite a number of machines; are there any figures as to the cost of the maintenance of the hose?

Mr. F. W. BRAZIER (Illinois Central): Our shops are all equipped with air. Since Jan. 1, 1896, we have renewed one 50-ft. length of hose. By using air we have reduced the cost of burning off passenger cars to $4.50 per car. Our compressor works with 80 lbs. steam pressure and 130 lbs. air pressure. Our paint shop floor is cement and, of course, will not wear the hose out as will a cinder or gravel floor.

Mr. PARKER: When I quoted a cost of 2⅕ cents for 1,000 ft. of air compressed to 1,000 lbs., it was based on coal at $3 per ton, and included oil, waste and engineers' services.

The Cost of Armor Plate.

On Jan. 5 Secretary Herbert submitted to Congress his report replying to the resolution which was approved last summer authorizing an examination into the actual cost of making armor plate, and a recommendation as to future prices.

The first attempts to secure information from the Carnegie and Bethlehem companies were failures, but on Nov. 25, 1896, the Bethlehem Company gave $250 as the cost of material and labor involved in making a ton of armor. To this they asserted should be added $78 per ton as interest on $4,000,000 invested in armor plate, $132 for maintenance and depreciation at the rate of 10 per cent. per year and $33 as interest on working capital estimated at $1,500,000. These figures gave a total cost of $494 per ton. Soon afterward the Carnegie Company also made reply, stating that the estimates made by naval experts as to the cost of armor omitted three important items—the interest on plant valued at $3,000,000, amounting to $81.53 per ton of armor; maintenance of plant, $67.94; loss by abandonment of plant when the navy shall have been completed, $75.49, making a total of $224.96, not including labor and material.

Secretary Herbert states that the above information from the two companies is of no assistance in arriving at a correct conclusion unless it be concluded that in one case the cost of the plant was $4,000,000, and in the other $3,000,000, as insisted upon. These letters were not written until after the return of the Secretary from Europe, where he procured two estimates of the cost of armor plants. One firm quoted $1,590,000 as the cost of building a plant equal in every respect to those in this country. Prices are, however, lower now than in 1887, when the Bethlehem Company began its plant, or even than in 1890, when the Carnegie Company began the manufacture of armor.

The report contains a table compiled by the Secretary, which gives a synopsis of reports of the Bethlehem Company to the Auditor-General of Pennsylvania from 1889 to 1896, inclusive, supplemented by another table of payments made to the company by the government as shown by the department records. This table states the authorized capital stock of the company in 1895 to have been $10,000,000, half of which was paid in, and on this dividends of 12 per cent. were declared in 1894 and 1895. The gross earnings in eight years were $46,000,000, and the net earnings $6,700,000. The surplus in 1895 was $4,392,271. The government has paid the company $15,000,000.

In order to ascertain exactly the profits made by the operation of the company's armor plant and gun plant, the following table was made, on the supposition that 10 per cent. per annum upon the original stock of $2,000,000 has been first deducted from the net earnings for the period in question.

Year ending Dec. 31.	Net earnings 10 Per cent. on $2,000,000.	Stock issued assumed to be at beginning of year.	22 per cent. dividend on outstanding stock from issue.	Surplus to reduce stock.	Outstanding stock.	Accumulated surplus to pay bonds.
1889..	—$193,003	$613,200	.....	.....	$313,200	.....
1890..	+ 290,847		.....	.....	845,050	.....
1891..	+ 100,844	1,154,950	.....	.....	2,000,000	.....
1892..	457,403	.....	$1,031,738	$114,696	1,885,304	.....
1893..	587,187	.....	414,876	678,854	1,206,450	.....
1894..	1,093,73	.....	265,419	1,095 985	110, 467	.....
1895..	1,361,402	.....	24,299	110,467	.....	$774,511
1896..	909.277	.....	.....	.....	.....	659,711
Total	659,711	.....	.....	.....	.....	659,711
	$5,169,554	.....	1,735,332	2,000,000	.....	1,434,222

The above shows that the company, after paying 22 per cent. on all money put into new plants from date of issue of stock and till its cancellation, can repay its stockholders in full an accumulated surplus of $1,434,222, sufficient to more than pay off its bonded debt of $1,351,000.

In the case of the Carnegie Company it has been necessary, in the absence of such returns as have come from the Bethlehem Company, to resort to the best evidence obtainable for the purpose of showing the value of its plant, the price of labor and material entering into a ton of armor and the amount that should be allowed the company for maintenance of plant. The figures of the company, namely, $3,000,000, were taken as to cost of plant, and for maintenance the company's figures were also taken, but this 5 per cent. was allowed only on $2,000,000, for the reason that the land and much of the plant requires no appreciable charge for maintenance. A table was prepared showing the tonnage delivered, the cost, including 10 per cent. for rejections, fixed charges, total cost, payments to the company by the government, net profits, dividends, net surplus and outstanding capital for each six months' period from Jan 1, 1892, to June 30, 1897, inclusive. It is estimated in this table that the cost of labor and material in a ton of nickel-steel armor is $148, plus the 10 per cent. on that sum allowed for loss from spoiled and rejected plates; in a ton of Harvey nickel-steel the cost is $168.53, plus 10 per cent., and in a ton of double-forged nickel-steel, $187.80, plus 10 per cent.

As a result of these inquiries Secretary Herbert has concluded that the present value of an armor plant like those of the companies referred to, is, in round numbers, $1,500,000; the allowance for maintenance, $150,000 per year while the plant is in operation. If it is supposed that 2,500 tons of armor are made per year, this gives an average of $60 per ton, which, being added to the cost of labor and material, makes a sum of $256. If 3,000 tons per year were made, the price of each ton would be found by adding $50 to the $196, making $246, so that $250 in round numbers may be taken as the cost of a ton of armor when the companies have fair orders for work. This is very near the figure of the Bethlehem bid for armor to the Russian government, which was $249. This company is said to have stated that it made this low bid to get into the European market with American armor, and that they knew they would suffer a loss.

Should the present armor contractors refuse to make contracts at the figure which may be decided upon by Congress it is not probable that others would undertake the work. For this reason, and because it is not believed to be desirable that the government itself should manufacture armor, very liberal profits should be offered to the present contractors to induce them to continue their plants in operation. It would not be inequitable to allow them 50 per cent. upon the cost of manufacturing armor for the three ships now under contract. This amount added to $250 would make $375, which plus $20 for the nickel in the armor, gives $395 per ton, or, in round numbers, $400. This seems to be an equitable price to pay for armor for the Wisconsin, Alabama and Illinois.

If Congress should authorize two or more battleships the Secretary suggests $375 per ton as a price to be paid for the armor. If this price is refused by the contractors it would seem better for the government to make its own armor than to pay a price which would seem to Congress and to the public to be extravagant. We now assemble our great guns at the Washington navy yard, and we do it successfully. Should contractors see that the government is willing at all times to pay fair profits they may come to feel, when they see that the Secretary has full power in the premises, that so long as they do efficient and faithful work at reasonable rates they will have government patronage.

In a report to the Senate Committee Senator Chandler recommends $300 as the price to be paid for armor.

Methods of Taxing Railroads in the Various States.*

Many methods for taxing railroads are in force in the different states, any one of which can be so adjusted as to place the amount of taxes such property ought to pay in an equitable and just proportion to that of other property. In our system of taxing railroads the tax can be raised or lowered as justice demands by increasing or decreasing the rate of per cent. on gross receipts. And if on assessed valuation, the same as other property, the tax can be increased or decreased by increasing or decreasing their assessed valuation.

Whether the taxes are too high or too low in this state is a question for the legislature to decide. This state's method of taxing gross earnings may not seem equitable when one or two years are considered, for a year of hard times would make low railroad taxes when other property might pay as much or more than in prosperous years. Railroad taxes, when computed on gross earnings for a term of years, compare favorably with taxes levied under any other method of railroad taxation, or with the amount of taxes paid by other property which is assessed on cash valuation. The reason for this is that the cash valuation of a railroad is fixed by the amount of its earnings taken for a term of years, regardless of the cost of construction. In short, the market value of a railroad depends upon its past, present and prospective earnings. But let the method of assessing and fixing the rate per cent. be what it may, the tax should be collected by the state, thereby benefiting every part of the state by such taxation. The method of distributing the tax collected from railroads in this state is a very wise and commendable one. The tax goes into the state primary school fund, and is paid out to each school district in proportion to the number of children of school age.

. . . I have carefully arranged, in a condensed form, the different methods used in the several states. For convenience in making comparisons of the different methods, those states having similar laws are grouped together.

Various States.

Arizona, California, Colorado, Idaho, Illinois, Missouri, Montana, Nebraska, North Dakota, South Dakota and Utah, by state boards of equalization: Arkansas Kentucky and North Carolina, by railroad commissioners; Alabama, Florida, Indiana, Iowa, Kansas, Mississippi, West Virginia and Wyoming, by various boards. The railroads in the above named states are taxed on their cash valuation, and that valuation is determined by state boards as indicated. These boards certify to the proper local officers the valuation of railroad property in each county or tax district, as the case may be. The tax is computed and collected locally.

Texas.

In Texas, the railroads are taxed on cash valuation but such valuation is determined by the Board of Equalization of the county in which is situated the principal office of the railroad assessed. The valuation is apportioned to the counties by the Comptroller of Accounts.

Georgia.

This state also taxes railroads on cash valuation, but the tax is collected by the state instead of by the local authorities.

Massachusetts.

In Massachusetts the cash value of the shares of capital stock of railroads is assessed by the state. Railroad property [outside the right of way] is also taxed locally the same as the property of individuals or other corporations.

Ohio.

Ohio railroads are assessed on cash valuation, which is equalized by a state board, but in addition to this tax, they are taxed specifically to the extent of $15,000 on gross earnings for the support of the department of Commissioner of Railroads.

South Carolina.

This state has a law similar to Ohio. The amount for the support of the railroad department is not specified.

New Hampshire.

In New Hampshire railroads are assessed on their cash valuation by the State Board of Equalization. The tax is collected by the state and one-fourth of it is paid to the towns in the ratio of the cost of construction. Also those towns in which stock is held get a certain percentage of the tax. The remainder of the tax goes to the state. Railroads are also taxed on their gross earnings for the support of the Board of Railroad Commissioners.

New Jersey.

In this state railroads pay one-half per cent. on the cash valuation of their property and franchise.

Tennessee.

Tennessee has two methods of taxing railroads. First, assessed on cash valuation of property and franchise by State Board of Assessors. Second, those roads not paying an *ad valorem* tax pay a privilege tax of from $100 to $10,000, depending upon the number of miles of road operated.

Vermont.

Vermont railroads are taxed one and seven-tenths per cent. on cash valuation, but any railroad company may, if it so elect, pay two and one-half per cent. on gross earnings.

Virginia.

In this state railroads pay three-tenths per cent. state tax and one-tenth per cent. school tax on their assessed cash valuation. The assessment is made by the Board of Public Works. They also pay a state tax of one per cent. on their net earnings.

Connecticut.

Connecticut taxes railroads one per cent. on equalized market value of capital stock and one per cent. on funded and floating debt.

Pennsylvania.

This state levies a tax of one-half per cent. on cash valuation of capital stock, eighth-tenths per cent. on gross receipts, and four-tenths per cent. on corporate loans to be deducted from the interest thereon.

Delaware.

Delaware levies a state tax of ten cents for each passenger carried, ten per cent. on net earnings (one half of), one per cent on cash value of capital stock. For county and municipal purposes railroad buildings and real estate, other than right of way, are taxed locally the same as other property, on the cash valuation. Any railroad company may, if it so elect, pay a specific State tax on its gross earnings, in lieu of the ten cent passenger tax, the rate per cent. depending upon that paid by the Philadelphia, Wilmington & Baltimore Railroad, which company pays the same amount of capitation tax each year.

Maryland.

This state levies a tax on gross earnings, the rate depending upon the earnings per mile of road, ranging from eight-tenths per cent. to two per cent. Railroads are also subject to county and municipal taxation the same as other property.

Maine.

A tax is levied on gross earnings, also all buildings, whether on or off the right of way are taxed locally the same as other property.

Various States.

Louisiana, Nevada, New Mexico, New York, Oregon, Rhode Island, and Washington assess and levy taxes on railroads the same as on other property.

The following states do not tax railroads on their cash valuation:

Michigan.

Michigan levies a specific state tax, in lieu of all other taxes, on gross earnings, the rate per cent. depending on the amount of gross earnings per mile of road, ranging from two to four per cent.

Minnesota.

Minnesota levies a uniform specific tax of three per cent. on gross earnings.

Wisconsin.

In Wisconsin the tax on railroads is in the form of a license, the amount of which depends upon the gross earnings per mile of road and the number of miles operated.

Recapitulation.

Out of the 47 states and territories above named, 25 levy taxes on the cash valuation of railroads exclusively, three on gross earnings exclusively, and 7 treat railroad property the same as other property. The remaining 12 have a combination of these and other methods.

As a general rule all railroad property not used for railroad purposes or situated along its right of way is taxed locally the same as other property. In those states where railroad property is equalized or assessed by the State and the tax computed and collected locally, the average value per mile of road is determined for each road. The value of railroad property in any particular tax district is then determined on a pro rata mileage basis.

* From the annual report of Hon. S. R. Billings, Railroad Commissioner of Michigan.

Nearly all the states where taxes were levied on capital stock, debt, earnings or rolling stock and most of those that levy taxes on cash valuation, assess railroads partly within and partly without the state on a pro rata mileage basis. That is, they first ascertain the total amount of capital stock, debt, earnings, rolling stock or cash valuation for the entire road, then the portion for any state is made in the ratio of the number of miles in that state to the total number of miles operated by that company.

COMPARATIVE TABLE OF STATES, SHOWING AMOUNT OF TAXES COLLECTED, EARNINGS AND MILEAGE FOR THE YEAR 1895. (Cents omitted.)

State.	Total taxes.	Taxes per mile of road.	Earnings.	Earn. per mile of road.	Miles.
Michigan	$741,408	$97	$29,211,014	$3,835	$7,615
Iowa	1,357,453	159	35,835,910	4,199	8 532
New York	7,862,480	978	106,234,129	13,226	8,032
Illinois	4,145,202	395	76,263,579	7,282	10,472
Massachusetts	3,527,820	1,668	41,418,991	19,589	2.114
Minnesota	850.109	141	30 952,220	5,166	5.990
Missouri	1,186,807	180	30.9 0,980	4,707	6,564
Indiana	2,.56,169	359	*155,597,930	.....	6,279
Kansas	2,187,030	245	17,131,227	2.051	8,921
Connecticut	786,518	780	15,139.630	15,017	1,008
Ohio	2,219,497	252	63,106,041	7,356	8,804
Aver. for entire U. S., June 30, 1895	.....	.....	1,207,803,595	6,685	180,657

* Assessed valuation.

TECHNICAL.

Manufacturing and Business.

The address of Mr. W. S. Logue, of the Edison Phonoplex (telegraph apparatus), which was described in the *Railroad Gazette* of Jan. 1, is Orange, N. J., not New York City as stated in the descriptive article.

Roberts, Throp & Co., Three Rivers, Mich., manufacturers of "Cyrus Roberts" section cars, have appointed Fraser & Bailey, 72 Trinity Place, New York, sales agents.

The Pennsylvania is now fitting up at the Altoona shops some 50 cars with Mr. H. E. Hoke's flush freight car door, which has been in use some years on a small number of Pennsylvania cars.

The Gold Car Heating Co. has closed contracts during the past few weeks to supply its improved steam-heating apparatus for the complete passenger equipments of the Louisville, Evansville & St. Louis Consolidated; Cornwall & Lebanon and Wilmington, Newbern & Norfolk roads. In addition to this the Gold Car Heating Co. shipped to England last week automatic steam traps and straight-port steam couplers for 300 passenger cars.

Mr. Curtis W. Shields, lately with the Ingersoll-Sergeant Rock Drill Co., now represents the Pedrick & Ayer Co., of Philadelphia, with office at 111 Liberty street, New York City. Mr. Shields is known as the author of many valuable articles on the subject of compressed air.

The Penn Steel Casting Co., Chester, Pa, is replacing the steam shaft crane in its chipping shop with a 20 ton electric crane and will put a similar crane in the machine shop. Preparations are also being made to still further enlarge the plant and install more smelting and drying furnaces.

The Cooke Locomotive Works have shipped a rotary snow plow to the government of Roumania.

A reorganization of the Sharpsville Foundry Machine Co., of Sharpsville, Pa., has been effected. An interest in the plant has been sold to George W. Johnson and Thomas M. Eagan, who in future will have control of the business. The works have been completely repaired. It is expected that the works will be in operation within a short time.

The Columbus & Hocking Coal & Iron Co., of Columbus, O., has been placed in the hands of J. O. Moss, as Receiver, on the application of the Receivers of the Baltimore & Ohio, who took cognovit judgments against the company for $63,405, freight charges. The company, whose bonded indebtedness is $530,000, owns 13,000 acres of coal lands and five furnaces. It is claimed that the receivership is only temporary.

The Missouri Smelting Co., of St. Louis, has reorganized and increased its capital stock to $100,000. The new directors are as follows: James Green, J. B. M. Kehlor, George A. Madill, A. F. Shapleigh, Webb M. Samuel, T. G. Comstock, J. H. Reifsnider, C. H. Goodman, D. P. Doak and E. R. A. Miseman.

The United States Circuit Court of Appeals announced a decision on Jan. 7 last in favor of the Chicago Pneumatic Tool Co., in the patent litigation with the American Pneumatic Tool Co., upholding the Chicago company's claims of non-infringement for the Boyer hammer manufactured by it.

The blooming mill, steel mill and other departments of the Bethlehem Iron Co. were started last week after an idleness of three months, employing over 1,000 men. The company's ordnance works will continue running day and night.

The National Switch & Signal Co., Easton, Pa., has recently closed a contract for an interlocking plant to be built at Mode, Ill., at the crossing of the new line connecting the Chicago & Eastern Illinois with the Chicago, Paducah & Memphis and the Toledo, St. Louis & Kansas City.

The Chicago Pneumatic Tool Co. is running its works night and day trying to keep up with orders for pneumatic drills and hammers. Among the more recent foreign orders was one for five hammers and one drill from the Nicopol Mariopol Mining & Metallurgical Co., of Mariopol, Russia.

The Cooke Locomotive & Machine Co. has this week opened a Western office in Chicago and placed Mr. James W. Cooke in charge as Western Manager.

Iron and Steel.

A charter has been granted to the Titusville Forge Co., Titusville, Pa., which has been incorporated with a capital stock of $30,000. The incorporators are J. P. Haule, J. Y. Dillen and J. G. Bentin, all of Titusville.

Tod furnace, of the Youngstown Steel Co., Youngstown, O., was blown in on December 28, after an idleness lasting several months. The furnace has under gone extensive improvements and repairs.

The South steel mill of the Lackawanna Iron & Steel Co., at Scranton, Pa., was put in operation on Jan. 7 after an idleness of four months. Fifteen hundred men will be employed. Colebrook Furnace No. 2, at Lebanon, Pa., has been blown out, and the company will place No. 1 furnace in blast within a few days.

New Stations and Shops.

The Ottawa, Arnprior & Parry Sound has purchased property in Ottawa East, Ont., and will shortly commence the construction of shops.

The Great Northern is said to have under consideration important plans for changing its entrance into Spokane, Wash., involving the construction of a new passenger station, freight-house and new tracks to give it independent terminal facilities at that point. The station, it is said, will be a two-story structure, with accommodations for the division officers, and the freight-house will be of brick and stone, the improvements altogether costing about $200,000.

Torpedo Boat No. 5 Launched.

The third of the torpedo boats to be built at the Columbia Iron Works for the United States government was launched on Jan. 6. Their contract price was $97,500 each. The three boats, which are of the same design and size, are to form part of a fleet of 16 sea-going torpedo vessels now being built in ship yards in different parts of the country. The boat just launched is 160 ft. long and 16 ft. broad, with a displacement of 142 tons. Her armament will comprise three 18-in. Whitehead torpedo tubes on her upper deck, trained to fire at any angle, and three one-pounder rapid-fire guns. She is estimated to be capable of a speed of 24½ knots per hour. This is gained by a machinery equipment of 2,000 H. P. Her crew will consist of 24 men, with four officers. The first of the boats is expected to be ready for her trial trip in about three months.

THE SCRAP HEAP.

Notes.

The Canadian Pacific will hereafter require the watches of trainmen to be inspected every six months.

On the Atchison, Topeka & Santa Fe holders of annual passees must hereafter sign their names, every trip, on slips of paper provided by the conductors. The conductor then handles these slips the same as he would handle trip passes.

The Governor of Massachusetts, in his annual message, recommends the passage of a law permitting the local taxation of street railroads and also a change restricting the power of towns and cities in granting locations for street railroads; there should be a right of appeal from the local municipal board.

The contract made by the Post Office Department with the United States Mail Package & General Pneumatic Delivery Co., of Philadelphia, to lay tubes between the New York and Brooklyn post offices, calls for the payment of $14,000 a year for four years. The tubes must be ready within nine months.

The proposal for the abolition of grade crossings, which has been before the Commissioners of the District of Columbia for about a year, involves two principal schemes, one to elevate the tracks of the Baltimore & Ohio within the city limits and the other to raise those of the Pennsylvania. From an annual report just presented it appears that the arrangements for the Baltimore & Ohio line are practically agreed upon, but the Pennsylvania line is so near the level of tidewater for a considerable distance that there is a disagreement between the road and the government officials as to how many feet the tracks should be depressed. Congress has not yet taken definite action, though it is expected to do so at this session. The published accounts give no information as to whether any progress has been made in the financial part of the negotiations with the railroads.

New York State Canals.

The report of Superintendent Aldridge, of the Public Works Department for 1896, shows an increase in freight carried on the state canals of 214,580 tons over that carried in 1895. Of this increase, 128,597 tons is in wheat and 103,434 tons in oats. The total tonnage of the canals was divided as follows:

	Tons.
Erie	2,747,438
Champlain	802,510
Oswego	57,245
Black River	57,953
Cayuga and Seneca	51,739
Total	3,714,885

Of the total tonnage, 1,126,665 tons was of agricultural products, 852,467 tons of forest products and 153,322 of manufactured articles. The average price received by the boatmen for carrying wheat from Buffalo to New York was about 3¾ cents per pushel. The delays to navigation have probably been as small as in any year in the history of the canals of the state. The water in the various levels has been kept at a remarkably uniform height, and little trouble has been experienced in Buffalo due to low water in Lake Erie. The work which will be done in that city during this winter will, it is believed, prevent any further difficulty from that low lake levels. The water supply is abundant at most points if it could be controlled by canal officials, but this control has been contested by mill owners and manufacturing interests of all kinds. Mr. Aldridge recommends the use of Seneca Lake as a storage reservoir for the Seneca and Cayuga Canal. An appropriation of $360,000 for extraordinary repairs and improvements is asked. Under the nine-million-dollar canal appropriation, contracts for $3,500,000 worth of work has been awarded. The Superintendent states that $770,000 will be needed for the next fiscal year for the payment of the expenses of lock tending and the ordinary repairs of the canal. There is a prospect that the cost of power for carrying freight will be greatly reduced after the completion of the improvement now in progress. Under the improved conditions he believes that there can be little doubt of a success in the direction of the application of steam as a motive power.

The Honduras Syndicate.

Articles of incorporation were filed at Trenton, N. J., on Dec. 30, by the Honduras Syndicate, a company which expects to secure concessions from the government of Honduras and grants of lands for the operation of several railroads. The capital stock is $500,000, and the incorporators are Chauncey M. Depew, of New York; William Seward Webb, of Shelburne, Vt.; J. G. McCullough, of North Bennington, Vt.; John Jacob Astor, F. B. Jennings, Benjamin F. Tracy, Nathan C. Prentice and Melville E. Ingalls, of New York, and Charles McVeigh, of Morristown, N. J.

Receiverships and Foreclosures.

SUMMARY OF RECEIVERSHIPS.

Year.	Number of roads.	Mileage.	Stocks and bonds.
1884	37	11.038	$714,755,000
1885	44	8.386	385,460,000
1886	13	1.799	70,346,000
1887	9	1,046	90.318,000
1888	22	3,270	186,814,000
1889	22	3.803	99,664.000
1890	26	2,963	105,007,000
1891	26	2.159	84.479,000
1892	36	10,508	357.692,000
1893	74	29,340	1,781,046,000
1894	38	7,025	395,791,000
1895	31	4,089	369,075,000
1896	34	5,411	275,597,000
Total for 13 years	412	90,876	$4,916,044,000

SUMMARY OF FORECLOSURE SALES.

Year.	Number of roads.	Mileage.	Stocks and bonds.
1876	30	3,840	$217,848,000
1877	54	3,875	198,984,000
1878	48	3,906	311,631,000
1879	65	4,909	243,288,000
1880	31	3,775	203,882,000
1881	29	2,617	127,923,000
1782	16	867	65,426,000
1883	18	1,354	47,100,000
1884	15	710	23,504,000
1885	22	3,156	278,494,000
1886	45	7,687	374,109 000
1887	31	5,478	328,181,000
1888	19	1.596	64,555,000
1889	25	2,930	137,815,000
1890	29	3,825	182,495,000
1891	21	3,223	168,069,000
1892	28	1,922	95,898,000
1893	25	1,613	79,934,000
1894	42	5,643	318,999,000
1895	52	12,831	761,791,000
1896	58	1,373	1,150,377,000
Total for 21 years	703	89,487	$5,440,293,000

—*Railway Age.*

The Rights of Labor.

The three men employed in the switch yards of the Galveston, Laporte & Houston road struck yesterday because the yard master's services had been dispensed with in the interest of economy. General Agent Smith took charge and other men were substituted.—*Galveston News.*

The C. & O. Marine Equipment.

The Chesapeake & Ohio has contracted with the Jackson & Sharpe Co., of Wilmington Del., for a new tug to be used for shifting large teamers about the piers at Newport News. The company is also asking for bids for a large car float to carry about 20 cars.

The Jungfrau Mountain Railroad.

As the reader probably knows the project for an excursion railroad to reach the top of the Jungfrau has been exploited for three or four years, but up to the present time the financial arrangements do not seem to have been completed and construction has not been begun. From one of our German exchanges we gather a few facts as to the present condition of the project. The proposed road will go from Interlaken over the Lauterbrunnen to the Wengernamp to the foot of the Eiger. Then it enters a tunnel from which it emerges into an open gallery above the Grindelwald. The summit station will be on the peak called Monchsjoch and the summit of the Jungfrau will be reached by an elevator. The railroad will be worked by electricity. It will be built to one meter gage with 25 per cent. maximum grade and curves of 100 meters minimum radius. The length of the road will be 12,260 meters (7⅝ miles), and the summit of the railroad proper will be 4,093 meters above the sea. The summit of the Jungfrau to be reached by a vertical lift will be 4,166 meters above the sea, or 73 meters above the summit railroad station. The cost is estimated at 10 million francs ($1,900,000), of which more than half will be consumed before tracklaying begins.

Proposed Railroad Pension Law.

A press despatch reports that Mr. Frank P. Sargent, chief of the Brotherhood of Locomotive Firemen, will ask the New York Legislature to pass a bill providing for the maintenance of the employees of railroad corporations injured in the discharge of their duty.

The bill will provide that whenever an employee of a steam railroad company shall become wholly or partly disabled while in the discharge of his duty the corporation shall provide for his maintenance and support by assessing any and all dividends paid by said corporation, not exceeding 1 per centum per year, or if no dividend is paid they shall assess and deduct from the gross earnings a sum not exceeding 1 per centum per year, and should that sum be insufficient the corporation shall

deduct from the salaries of its employees an amount not exceeding one-half of one per centum per year.

While an employee is disabled he shall get half pay as long as incapable. If killed, the road is to give the widow 50 per cent. of the salary the deceased man earned, so long as she remains unmarried, and then to the minor children until they are of age, or if there are no children the 50 per cent. to go to a dependent father or mother during their lives.

The act is not to be effective against any corporation until a majority of employees of such road certify that they desire it.

Annual Passes.

Annual passes are becoming plainer. The passes of 1897 indicate more simplicity in business methods of general managers than formerly, though to an artistic eye less grace and beauty. The Pullman Company this year confines itself to plain light blue on plain linen paper. Of all passes that of the Chicago & Alton is the most beautiful, being stamped on deep blue with an abundance of gilt. The Burlington, Cedar Rapids & Northern is a pretty pass with the seals of the states through which it passes. The Chicago Great Western has the invariable maple leaf across the center, while the Burlington exhibits its usual caution by stamping across the pass the words, "Burlington Route." The Chesapeake & Ohio has a very plain card, much like a visiting card. Most passes have rounded corners, but the Milwaukee and several others favor the square. The Pennsylvania issues a very plain pass, while the Lake Shore & Michigan Southern and the Duluth, South Shore & Atlantic and many others of less renown are very pretentious. The latter presents a picture of Duluth harbor. The annual passes sent out by the International & Great Northern are among the handsomest sent out this year. The design embraces the flag of the United States, the territorial flag of Texas and the lone star of the flag of Cuba. This would seem to indicate very clearly where the sympathies of the officers of the road lie. . . . After all, the main feature of this year's passes is their scarcity.—*Exchange.*

North Eastern Locomotive Works.

The Engineer of Dec. 18 contains a description, with numerous fine illustrations, of the Locomotive Works of the North Eastern Railway at Gateshead. In the same issue are very fine engravings in general and in detail of Mr Wilson Wordsell's fast express locomotive, which was described in the *Railroad Gazette* of Sept. 11. Th article is well worth the attention of railroad mechanica engineers.

The Victoria Bridge.

For some time past it has been rumored that certain changes were contemplated on the Victoria Bridge, Montreal. It is now said that Mr. Chas. M. Hays, General Manager of the Grand Trunk, is authority for the statement that, if sufficient assistance be given by the Dominion and Provincial governments, it is the intention of his company to replace the present tubular bridge, with truss spans for double tracks, with a street car tramway and footpath on each side. Demands for better accommodations between the two sides of the river have reached the company from a couple of sources, one coming from people of St. Lambert, who want more frequent and quicker communication than that furnished by the present train service, and the other from the railroad connections from the south, who wish to avoid the delays which are now experienced, consequent upon the use of the present single track on the bridge. On account of these demands, and because it has been represented to the road that the proposed work in replacing the present structure with a new bridge was one of sufficient importance to warrant both provincial and national aid, the company has intimated to the proper authorities its willingness to provide the necessary facilities, in the event they are willing to grant such aid.

The Victoria Bridge was designed by Robert Stephenson. It is 9,144 ft. long from out to out of abutments, and is built of iron on the tubular principle. The total length of the tubes is 6,592 ft., and the height above the river to the bottom of the center span is 60 ft There are 24 spans varying from 242 ft. to 247 ft. each in length, with one in the center of 330 ft. The grade of the tubes from each end toward the center is 1 in 130, and the weight of the tubes is 9,044 tons. The piers are built of solid masonry, and the total amount of masonry in the piers and abutments is 100,000 cu. yds. The tube through which the track is laid is 22 ft. high and 16 ft. wide. The total cost of the structure was $6,300,000. The builder was James Hodges, and Sir Samuel Morton Peto, Thomas Brassy and Edward Ludd were the contractors. The first stone of the bridge was laid on July 20, 1854, and the first cofferdam was ready for masonry on Aug. 2 of the same year. The bridge was opened for traffic on Dec. 17, 1859.

LOCOMOTIVE BUILDING.

The Grand Rapids & Indiana has received six new consolidation locomotives. They are somewhat similar to the class "R" of the Pennsylvania, and were built at the Altoona shops.

CAR BUILDING.

The Fort Wayne shops of the Pennsylvania Co. have recently built about 200 new box cars.

The Northern Pacific is figuring on contracts for new passenger equipment for spring delivery.

The Berwind-White Coal Mining Co. has ordered 150 freight cars from the Middletown Car Works.

The Youngstown Car Works, which have been idle for more than a year, resumes on Monday of this week on a large repair order for coke cars.

BRIDGE BUILDING.

Benton Harbor, Mich.—The St. Joseph Valley will build a 300-ft. iron railroad and highway bridge over the St. Joseph River at this place.

Columbia, Pa.—The Pennsylvania Railroad has asked for bids, which will have to be in by to-day, for the rebuilding the bridge across the Susquehanna at this place. The bridge was destroyed by a cyclone on Sept. 29 last. The new bridge, which will be of iron and steel, will be 6,500 ft. long, and will be double-decked. The lower deck will be used for the railroad track and the upper as a wagon road. The upper deck will be longer than the lower deck, in order to carry the wagon-way over the railroad tracks, and thus remove the dangerous grade crossings. About 7,000 tons of iron and steel will be required to build the bridge. The piers and abutments of the old structure, which were but slightly damaged, will be used to carry the superstructure of the new bridge.

Homer City, Pa.—A wooden township bridge over Cherry Run, near here, collapsed the other day under the weight of a traction engine. An iron bridge will probably take its place.

Long Island City, N. Y.—The Long Island Railroad has given the contract for a new steel bridge over its tracks to the Wrought Iron Bridge Co., Canton, O., at $4,630.

Milwaukee, Wis.—Bids are asked by the Board of Park Commissioners until Feb. 4 for furnishing and erecting the iron and steel work of two bridges in Lake Park. Plans are on file in the office of the Board and also in the office of Oscar Lanne, Consulting Engineer, of this city. Chas. K. Lush, Secretary.

It is stated that plans have been prepared for a 215 ft. double-deck steel bridge, 40 ft. wide, over the Kinnickinnic River on the Chicago & Northwestern.

Montpelier, Vt.—Bids are asked for the masonery of a steel bridge, 150-ft. span, 30-ft. roadway, plans for which will be ready in about a month. C. S. Currier, Engineer in Charge, Barre, Vt.

New York.—It is stated that the New York & New Jersey Construction Co., the company which will build the bridge over the Hudson River for the New York & New Jersey Bridge Co., will have its prospectus of the bridge, including the proposed freight approach extending from Fifty-ninth street to the Battery, ready for distribution in less than a week. When this is ready, the company will sell its bonds, the proceeds of which will be used to build the bridge. After that the stock of the bridge company will be offered for sale. On Dec. 1 the construction company made a contract with the Union Bridge Co., to build the bridge for $25,000,000.

The committee appointed by the North Side Board of Trade to look after the interests of the residents in regard to the approaches to the new Third avenue bridge, has been asked by General Collis, of the Department of Public Works, to submit plans and suggestions for the approaches.

The House bill, extending the time for the completion of the East River Bridge of the Long Island Railroad across Blackwell's Island until Jan. 1, 1902, has been passed.

Niagara Falls, N. Y.—A contract for overhead crossings, at Ferry and Walienut streets, has been entered into between the city and the Erie.

Ogden, Utah.—A contract has been made with the Andrews Bridge Co., to build two approaches to the Weber bridge and a small bridge across Weber River near the West Weber bridge.

Providence, R. I.—It is stated that it is proposed to build a bridge in Roger Williams Park. R. H. Deming, Park Commissioner.

Springfield, O.—It is stated that plans are being prepared for a 120-ft. plate girder or steel truss span, with with 24-ft. roadway and two 8-ft. sidewalks, over the creek in Snyder Park. D. F. Snyder, City Engineer.

Winnipeg, Man.—The application to build a bridge over the Canadian Pacific Railway tracks at Salter street has been considered by the Railway Committee of the Privy Council at Ottawa.

York, Pa.—It is said that the contract for a new steel bridge and viaduct over the tracks of the Pennsylvania, on College avenue, has been awarded to the Wrought Iron Bridge Co., Canton, O., for $43,600.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Augusta & Savannah, $2 50 per share, payable Jan. 15
Burlington, Cedar Rapids & Northern, semi-annual. 2 per cent., payable Feb. 1.
Central Railroad of New Jersey, quarterly, 1¼ per cent., payable Feb. 1.
Great Northern, quarterly, 1¼ per cent on preferred stock, payable Feb. 1.
Little Schuylkill Navigation Railroad & Coal Co., 3½ per cent., payable Jan. 15.
Mine Hill & Schuylkill Haven, 3¼ per cent., payable Jan. 15.
Rutland, 1 per cent. on preferred stock, payable Jan 2

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Fort Wayne & Jackson, annual, Jackson, Mich., Jan. 23.
Illinois & Iowa, annual, Chicago, Jan. 20.
Lehigh Valley, annual, Philadelphia, Jan. 19.
Pittsburgh & Lake Erie, annual, Pittsburgh, Pa., Jan. 25.
San Francisco & North Pacific, annual, 222 Sansome street, San Francisco, Cal., Jan. 19.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Baggage Agents* will hold a convention at Richmond, Va., on Jan. 20, 1897.

The *International Association of Car Accountants* will hold a convention at New Orleans, La., on Feb. 23, 1897.

The *American Railway Association* will hold its convention at Richmond, Va., on April 7, 1897.

The *National Convention of Railroad Commissioners* will be held at St. Louis, Mo., on May 11, 1897.

The *International Association of Ticket Agents* will hold a convention at San Antonio, Tex., on March 10, 1897.

The *Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.

The *Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.

The *Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.

The *American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.

The *National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.

The *Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.

The *National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.

The *Train Despatchers' Association of America* will hold a convention at Detroit, Mich., on June 22, 1897.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p m.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building Roanoke, at 8 p. m.

Engineers' Club of Philadelphia.

The eighteenth annual meeting of the Engineers' Club, of Philadelphia will be held at 1122 Girard street, on Jan. 16, at 8 p. m. The annual report of the Board of Directors will be read at this meeting. Mr. Arthur Falkenau, the retiring president, will deliver his annual address, the subject being "The Engineer as a Moral Force." Officers will be elected at this meeting for the ensuing year.

North-West Railway Club.

At the regular meeting of the club held at the West Hotel, Minneapolis, on Tuesday, Jan. 12, at 8 p. m., the following papers were presented: "Railroads," by D. Willard, Assistant Superintendent, Soo Line; "Methods Used in Removing Old Varnish and Weather Stains from Natural Woods, Preparatory to Revarnishing," by J. C. Stout, Foreman Painter, Soo Line. Discussion was held on the paper read at the November meeting by Prof. H. Wade Hibbard on "The Teaching of Railway Mechanical Engineering."

New England Railroad Club.

At the regular meeting of the New England Railroad Club, held on Dec. 8, in Wesleyan Hall, Boston, Mass., 111 members were present. Discussions were held on the following subjects: "Is it desirable to abandon the use of Dummy Couplings for Air Hose?" and "What are the best and most economical forms of Boiler Coverings?"

At the meeting on Jan. 12 the following subjects were cussed: "Is it advisable to make any change in the M. C. B. Rules of Interchange?" and "To what extent is it economy to limit the consumpiion of oil per engine mile?"

Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held on Jan. 4. Present, 16 members and 3 visitors. The annual election resulted in the following list of officers for the year 1897: President, K. E. Hilgard; Vice-President, Oliver Crosby; Secretary, C. L. Annan; Treasurer, A. O. Powell; Librarian, A. W. Munster; Representative on the Board of Managers of the Association of Engineering Societies, E. E. Woodman. Mr. L. W. Rundlett read a paper on the "Centerville Extension of the St. Paul Water Works," exhibiting maps, drawings and specimens of material. The detail of conduit construction, the locations of mains, artesian wells and pumping stations and statements of quantities and cost were given.

Engineers' Club of St. Louis.

A meeting was held at 1600 Lucas Place, St. Louis, Jan. 6, Vice-President Bryan in the chair, with 24 members and one visitor present. C. E. Delafield, G. S. Montgomery and A. L. McRae were elected to membership in the club. The names of Messrs. W. H. Boehm, Instructor of Mechanical Engineering, Washington University, and David R. Williams, Mechanical Superintendent, Planters' Hotel, were proposed for membership and referred to the Executive Committee.

The paper of the evening, by Mr. F. F. Harrington, was then read. It was entitled "A New Testing Machine and the Cross-Breaking Test of Vitrified Brick." The paper was illustrated by lantern slides, drawings, photographs and broken specimens of paving brick. The testing machine was described, and the methods of calibrating the machine and determining its friction were explained. A number of tests of vitrified paving brick were given and broken specimens were exhibited. In conclusion, standard methods for making the cross-breaking test of vitrified brick were proposed.

Meeting and Banquet of Western Society of Engineers.

The annual meeting and banquet of the Western Society of Engineers was held Tuesday evening, Jan. 5, at the Technical Club, Chicago. A brief business meeting was held before the banquet and the result of the election of officers for the ensuing year was announced. The officers elected are as follows: *President*, Mr. Thomas T. Johnston; *First Vice-President*, Mr. Alfred Noble; *Second Vice-President*, Mr. James J. Reynolds; *Treasurer*, Mr. Emil Gerber; *Trustees*, Mr G. A. M. Liljencrantz, Mr. Horace E. Horton and Mr. Ferdinand Hall.

At the banquet Mr. Alfred Noble spoke for the retiring President, Mr. J. F. Wallace, who could not attend, on the work done by the society during the past year. Among others, the following made short addresses: Mr. Normand L. Patton, Mr. Robert W. Hunt, Mr. A. J. Tullock, Mr. George Beaumont and Mr. Emil Gerber. Mr. Rintaro Normura, Engineer of the Imperial Railway Bureau, and Mr. J. Koboriis, Mechanical Engineer of the Yokohama Union Electric Light Company, Japan, who are visiting in this country, were guests of the society. One hundred and sixteen were present at the banquet.

Central Railway Club.

The annual meeting of the Central Railway Club was held on Jan. 8, at the Hotel Iroquois, Buffalo, with an unusually large attendance. Reports were submitted as follows: "Apprentice Boys in Railroad Shops." Committee: John Mackenzie, M. L. Flynn, E. D. Nelson, W. G. Taber, W. Lavery. "As inconvenience is experienced in practice, is it necessary to apply repair cards indicating repairs made upon cars in transit, in view of the fact that such repairs are sometimes made by trainmen and others who have not the facilities to make such application? What exception, if any, should be made to the rule covering this question?" Committee: J. R. Petrie, George Faber, G. N. Dow, William Shone, Robert Potts. The following subjects were discussed: "What is the Best Plan to Bring About the Adoption of M. C. B. Standards by Railroads?" "Shall the Cubic Capacity of Ordinary Box Cars Be Increased; and if so, What Shall be the Maximum Limit?"

The election of officers for the ensuing year resulted as follows: President, John MacKenzie, Superintendent Motive Power, Nickel Plate; Vice-President, John S. Lenz, Superintendent Car Department, Lehigh Valley; Secretary and Treasurer, Harry D. Vought. Executive Committee: A. M. Waitt, Master Car Builder, Lake Shore; E. D. Bronner, Assistant Superintendent Motive Power, Michigan Central; E. A. Miller, Master Mechanic, Nickel Plate; J. R. Petrie, Joint Inspector. The Executive Committee selected these subjects to be reported upon at the next meeting: "Brick Arches in Locomotive Fire Boxes" Committee: F. B. Griffith, George Hazleton, E. P. Mooney, A. E. Mitchell, George W. West. "Piece Work in Car Repairs." Committee: H. C. McCarty, Thomas Anderson, John S. Lentz, J. R. Petrie, Robert Gunn.

The seventh annual dinner of the club was held in the evening at the Hotel Iroquois.

Western Railway Club.

At the meeting of the Western Railway Club, at the Auditorium Hotel, Chicago, on Dec. 15, the Executive committee reported the election of G. M. Basford as Secretary of the club, to succeed Mr. Crosman, resigned.

SOCIETY OF RAILWAY CLUB SECEETARIES.

President A. M. Waitt stated, on behalf of the Executive Committee, that during the past two days a permanent organization, called the Society of Railway Club Secretaries of the United States has been formed in New York, the object being the solution and development of problems connected with the working of the several railway clubs in the interest of all the members thereof. The action of this organization is recommendatory entirely, not binding upon any of the clubs unless the action is approved afterward by the Executive Committee of the club itself. The meetings of the society are to be held twice each year. It is the intention that one of the meetings shall be held at the regular June conventions of the Master Car Builders' and Master Mechanics' Associations and another one in the fall or winter at such place as may be decided upon by the chairman. Among other things considered at this meeting of the secretaries and acted upon, were recommendations in regard to the continuation of different distinguishing colors for the proceedings of the different clubs, and another question with regard to the payment of one dollar or fifty cents a year, as the case might be, for the proceedings of the different clubs. For instance, if members of the New York Club wish to have the proceedings of the Western Railway Club, not being members of the Western Railway Club, they would have such proceedings mailed to them regularly by the payment of say one dollar a year, which would cover the expense of the printing and postage, which is now paid for by the club treasurers, making it at the present time quite a hardship and burden on some of the smaller clubs who have now to print more copies of the proceedings for their sister clubs than they do for their own members. The executive committee is not prepared to make any recommendation, but has taken steps to communicate with other clubs with a view of taking concerted action later if it is deemed wise. The executive committee desired this club to express its approval of this organization and promise support so far as it is necessary. For instance, the expenses of the correspondence and stationery to carry on such work as may be carried on by the society would amount to fifty or sixty dollars a year and each club represented in the organization will be assessed. The executive committee, before authorizing a payment of that kind, wished to present the subject to the club and see whether the organization was endorsed and approved. It was voted that this club indorse the suggestion of the Executive Committee.

It was also voted that a committee be appointed to take action upon the death of Mr. D. L. Barnes and draw up such resolutions as may be deemed appropriate. President Waitt appointed the following committee: Mr. Geo. Gibbs Mr. William Forsyth, Mr. Willard A. Smith, Mr. J. N. Barr and Mr. E. M. Herr.

PERSONAL.

—Mr. H. K. Gilbert, Auditor of The Crane Co., of Chicago, up to Jan. 1, has been elected Treasurer of The Sargent Co., Chicago.

—Dr. Charles Huston, President of the Lukens Iron & Steel Co., of Coatesville, Pa., died in Coatesville on Jan. 5, aged about 75 years.

—Mr. W. H. Warburton has been appointed Eastern Passenger Agent of the Clyde Steamship Co., with office at 5 Bowling Green, New York City.

—Mr. George Dullnig has been appointed Receiver and General Manager of the San Antonio & Gulf Shore road, in Texas, in place of Mr. Henry Terrall.

—Mr. A. J. Taylor has been appointed Canadian Freight and Passenger Agent in Chicago of the Chicago, Milwaukee & St. Paul. His headquarters will be at Toronto.

—Mr. George L. Rhodes, General Agent of the Seaboard Air Line, at Portsmouth, has been appointed its District Passenger Agent in Washington, to succeed Mr. R. A. Parke.

—Mr. Hugh A. Winter, General Passenger Agent of the Illinois Central, died at his home, in Chicago, on Jan. 3, aged 60 years. Mr. Winter had been connected with the Illinois Central for 30 years.

—Mr. Edward O. Macfarlane, Superintendent of the Barclay Railroad and of the Long Valley Coal Company, also President of the Citizens' National Bank of Towanda, Pa., died in that city Jan. 5, aged ..

—Mr. George H. MacRae, formerly Chief Clerk of the General Passenger Department of the Chicago, St. Paul, Minneapolis & Omaha, has been appointed Assistant General Passenger Agent of the road. The appointment took effect Jan. 1.

—Mr. Frederick Rogers, formerly General Freight Agent of the Eastern Railway of Minnesota, has been appointed General Passenger & Freight Agent of the Washington & Columbia River, with headquarters at Walla Walla, Wash.

—Mr. C. W. Haskins, of the accounting firm of Haskins & Sells, of New York City, has been elected the Comptroller of the Central of Georgia. Mr. Haskins has been appointed to this office to carry out a complete reorganization of the system of accounts.

—Mr. G. T. Newbury has been appointed General Freight Agent of the Old Dominion Steamship Line. Mr. Newbury was at one time a purser on one of the company's steamers, and recently held the position of Chief Clerk of the Traffic Department. The appointment took effect Jan. 1.

—Mr. A. D. Tice, formerly Superintendent of the Atlantic City Railroad (a Philadelphia & Reading line) ha been appointed Assistant Superintendent of the Read ing Division of the Philadelphia & Reading, and no Assistant General Superintendent of the road, as stated in a recent notice in these columns.

—Mr. William J. Black has been promoted to General Passenger Agent of the Atchison, Topeka & Santa Fe, in place of Mr. George T. Nicholson, who has been appointed General Passenger Agent of the St Louis & San Francisco road. Mr. Black has heretofore been Assistant General Passenger and Ticket Agent.

—Mr. A. F. Barnett, who has for many years been connected with the New Orleans & Northeastern road as Division Freight Agent in New Orleans, has been appointed General Freight and Passenger Agent of the same road, vice Mr. I. Hardy, deceased. The office of Division Freight Agent will be abolished.

—Mr. John J. Archer has been appointed General Freight & Passenger Agent of the Ohio River Railroad; the Ravenswood, Spencer & Glenville, and the Ripley & Mill Creek Valley. He succeeds Mr. W. J. Robinson, who has been assigned to other duties. Mr. Archer's appointment took effect on Jan. 1. He was formerly Assistant General Freight and Passenger Agent.

—Mr. William V. Reynolds, Receiver of the Lebanon Springs Railroad a line about 60 miles long in Northern New York, whose affairs have been in the courts for a great many years, died suddenly in New York City last week. He was a lawyer and prominent in Democratic politics for many years past. He was associated with the early history of the Hoosac Tunnel & Western road.

—Mr. Wm. Gibson, who has been acting as assistant to General Manager Wm. M. Greene, of the Baltimore & Ohio, has been appointed Assistant General Superintendent, in charge of the operations of all lines of the B. & O. east of the Ohio River. He will have his headquarters at Camden Station, Baltimore. Mr. Gibson was recently Division Superintendent of the Big Four, at Springfield, O.

—Mr. O. B. Grant, formerly Chief Clerk in the office of the General Superintendent of the Great Northern, has been appointed Superintendent and Assistant Treasurer of the Mason City & Fort Dodge, succeeding E. S. Hitchins, who recently resigned to enter the auditing department of the Chicago Great Western. Mr. Grant was previously with the Chicago, Milwaukee & St. Paul, at Milwaukee, and with the Pennsylvania at Louisville.

—Mr. W. W. Atwood has been appointed General Superintendent of the Addison & Pennsylvania Railroad as the successor of Mr. F. M. Baker, who resigned that office to become State Railroad Commissioner of New York State. Mr. Atwood has been recently in the freight department of the Delaware, Lackawanna & Western, but was formerly Superintendent of the Bradford, Eldred & Cuba, which was abandoned a few years ago. It was operated by Mr. T. C. Platt as Receiver, the President of the Addison & Pennsylvania line.

—Mr. I. Hardy, General Freight and Passenger Agent of the New Orleans & Northeastern road, died at New Orleans, La., on Dec. 31, after a brief illness. Mr. Hardy had been in railroad service since 1861, the entire time in the traffic departments of the roads comprising the Queen & Crescent lines. In 1881 he became General Freight and Ticket Agent of the Vicksburg & Meridian road, having previously been Chief Clerk in the department for nearly 15 years. In 1886 he was made Assistant General Freight and Passenger Agent of the Queen & Crescent lines, and when the roads composing that line were separated he became General Freight and Passenger Agent of the New Orleans & Northeastern.

ELECTIONS AND APPOINTMENTS.

Addison & Pennsylvania.—W. W. Atwood has been appointed General Superintendent of this road, vice Frank M. Baker resigned, with headquarters at Addison, N. Y.

Atlantic City.—G. D. Whitcomb has been appointed Superintent, vice A. T. Dice, resigned, with office at Camden, N. J.

Baltimore & Ohio.—William Gibson, who has been acting as assistant to General Manager Greene, has been appointed to the position of Assistant General Superintendent in charge of all the lines of the Baltimore & Ohio east of the Ohio River.

Baltimore & Ohio Southwestern.—The following changes were effective Jan. 11: W. W. McMahon becomes Superintendent of the Springfield Division; H. C. Barnard, who has been Assistant Superintendent, will become Superintendent of the St. Louis, Washington, Cincinnati and Louisville Division; I. L. Burlingame will be transferred from the Springfield Division to the St. Louis Division as Trainmaster. The office of Assistant Superintendent of the St. Louis and Springfield Divisions will be abolished, also that of Trainmaster of the Springfield Division. Trainmaster E. R. Scoville will be transferred from Chillicothe to Cincinnati, in charge of Cincinnati terminals.

Boston Elevated.—The annual meeting was held Jan. 11 and the following directors were elected for the ensuing year: Frederick Ayer, Jacob C. Rogers, William Endicott, Jr., Robert Winsor, Eben D. Jordan, Charles J. Paine, Samuel Carr, William A. Gaston, James M. Prendergast, William A. Bancroft, Francis H. Peabody, T. Jefferson Coolidge, Jr. These are the same directors as last year, with two additional members added to the board, Robert Winsor and Wm. A. Bancroft.

Brooklyn Elevated.—The annual meeting of the stockholders was held Jan. 5. Ernest Thalmann, Edward Lauterbach, Leonard Lewisohn, Simon Rothschild, Jacob Scholle, Henry Sidenberg, Simon Uhlmann, George W. Wingate, Elisha Dyer, Jr., William Halls, Jr., and Emil Schaefer of the old board, were elected Directors, and Henry W. Putnam was elected to the place of Elbert Snedeker.

Carolina & Cumberland Gap.—The present officers of this company are as follows: President, L. V. F. Randolph, 39 William street, New York; Vice-President and Treasurer, J. W. Fowler, Aiken, S. C.; Secretary, John J. Cahill, 39 William street, New York.

Chicago & West Michigan.—This road, and the Detroit, Grand Rapids & Western, have abolished the office of Assistant General Freight Agent. Mr. W. Rose, who has held that position for many years, will be transferred to another position.

Cleveland & Pittsburgh.—The annual meeting of the stockholders was held Jan. 8. The old Board of Directors was re-elected, as follows: R. F. Smith, J. V. Painter, E. R. Perkins, M. A. Hanna, H. C. Ranney, Cleveland; E. A. Ferguson, Cincinnati; J. L. Brooks, Salem, O.; George B. Roberts, Philadelphia; H. Darlington, Pittsburgh; Charles Lanier, William C. Eggleston, and J. S. Kennedy, New York. The time of holding the annual meeting was changed to the Thursday following the third Wednesday in May.

Columbus, Sandusky & Hocking.—W. W. Daniel has been appointed General Freight Agent, to succeed C. C. Collins, previously Acting General Freight Agent. Office at Columbus, O.

Cornwall.—The company elected these officers on Jan. 11: President, W. C. Freeman; Secretary and Treasurer, D. S. Hammond; Managers, E. C. Freeman, R. Percy Alden, B. H. Buckingham and D. S. Hammond.

Delaware & Hudson Canal Co.—James P. Dickson has been appointed Soliciting Freight Agent for the Pennsylvania Division, with office in D. & H. Passenger Station, Lackawanna avenue, Scranton, Pa.

Dry Fork.—S. S. Mosser has been appointed Auditor, to succeed James Hamill, resigned. W. W. Booker has been appointed Road Master to succeed John W. Moore, Jr., previously Chief Engineer, which office has been abolished since the resignation of Mr. Moore. Headquarters at Hendricks, W. Va.

East Broad Top.—B. F. Ripple, formerly General Passenger Agent, having resigned, the office of General Passenger Agent has been abolished.

Gulf & Ship Island.—The officers of this company are now as follows: President, J. T. Jones; Vice-President, C. P. Collins; General Manager, S. T. Bullis; General Freight Agent and Treasurer, W. W. Bell; Secretary, J. T. Powers; General Counsel, E. J. Bowers, and General Agent, Thos. P. Hale. The chief office if at Gulfport, Miss. The President's office is at Bradford, Pa.

Gulf, Colorado & Santa Fe.—A circular was issued from the office of General Superintendent Ressenguie, on Jan. 2, appointing M. R. Pendle Acting Superintendent of the Northern Division, to succeed A. J. Davidson, resigned.

Hutchinson & Southern.—Receiver L. E. Walker has issued a circular appointing W. A. Bradford, Jr., General Manager of the road, with headquarters at Hutchinson, Kan. The appointment became effective Jan. 1.

Lake Shore & Michigan Southern.—J. G. Jones, Assistant General Freight Agent at Cleveland, having resigned, that office has been abolished. James L. Clark

has been appointed General Western Freight Agent, with headquarters at Chicago.

Lehigh & New England.—S. S. Vandruff is now Superintendent of the New Jersey Division, with office at Deckertown, N. J.

Long Island.—The circular, appointing Mr. H. B. Hodges, Purchasing Agent and Superintendent of Tests defines his duties thus: as superintendent of tests he will arrange for and have general supervision af the inspection and testing of supplies purchased, as well as of tests in acutal service, and will issue specifications covering the material to be inspected.

Manhattan.—The company has leased for a term of years the first floor and most of the fourth floor of the Western Union Building, at Broadway and Dey street, No. 195 Broadway, New York City, for its general offices.

Middie Tennessee & Alabama.—This road is now being operated by Gaunt Crobs, of Fayetteville, Tenn., as Receiver. The line now built is about 30 miles long between Madison Cross Roads in Northern Alabama and Fayetteville.

Minneapolis, St. Paul & Ashland.—At a stockholders' and directors' meeting at Ashland, Wis., the following officers were elected: President, J. W. Cochran; Vice-President, S. G. Cook; Secretary, C. H. Pratt; Treasurer, Scott Ellis; Directors, Thomas Bardon, J. W. Cochran, Edwin Ellis, S. S. Fifield, E. A. Shores, J. S. Portous, of Minneapolis; R. L. McCormick, of Hayward; F. R. Pettibone, of Minneapolis; L. B. Eagan, D. W. Mowatt, C. H. Pratt and J. W. Perley, of St. Croix Falls.

New York, New Haven & Hartford.—At a meeting of the directors at New Haven Jan. 11, the position of Third Vice-President was formally declared abolished, and Collin M. Ingersoll was appointed assistant to the President, with office at Park Square Station, Boston.

Northern Pacific.—E. C. Blanchard, St. Paul, has been appointed Acting Superintendent of the Lake Superior Division, succeeding Mr. Wilsey, promoted to the General Land Department. Mr. Fowler, Minneapolis, has been appointed Assistant Superintendent of the Minnesota Division, with headquarters in St. Louis. The appointments are effective Jan. 1.

Ohio River.—The following appointments took effect on Jan. 1: J. K. Dye, Commercial Agent; Ashby J. Smith, Traveling Passenger Agent, and Jay Archer, Soliciting Agent. The office of Southern Passenger Agent has been abolished, and F. A. Zimmerman, who held that office, will enter commercial life.

Ottawa & Gatineau Valley.—G. C. Dunn has been appointed Chief Engineer of this road, the appointment taking effect from Dec. 15.

Philadelphia & Reading.—A. T. Dice has been appointed Assistant Superintendent of the Reading Division, vice I. T. Bossert, appointed Assistant Superintendent of the Philadelphia & New York Division, succeeding G. D. Whitcomb, transferred to the Atlantic City road.

Philadelphia, Wilmington & Baltimore.—The following directors were elected last week: George B. Roberts' William Sellers, Jacob Tome, John P. Green, Benjamin F. Newcomer, Frank Thomson, Skipwith Wilmer, Hon. Edward Lloyd, E. T. Warner, German B Hunt, B. B. Comegys, N. P. Shortridge, Preston Lea; John Cassels and William H. Barnes. The stockholders elected the following officers: President, George B. Roberts; Vice-Presidents, Frank Thompson, John P. Green, Charles E. Pugh; Secretary, Joseph C. Sims; Treasurer, Robert W. Smith.

St. Mary's & Southwestern.—E. Ford has been appointed General Superintendent of this road, to succeed B. E. Wellendorf, with office at St. Mary's, Pa.

Texas Central.—P. T. Mooney, Master Car Builder, has been appointed Master Mechanic also, at Walnut Springs, Tex., to succeed F. H. Dehn.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Aberdeen & Rock Fish.—This North Carolina company contemplates building an extension of about 10 miles, President John Blue states, and the work of construction will probably begin this month. Offices of the company are at Aberdeen, N. C., but the post office of the Chief Engineer, C. H. Scott, is Warrenton, N. C. The company now operates only 15½ miles of road from Aberdeen to Endon N. C., and between Hilton and Buffalo, N. C., under a charter granted by the General Assembly of 1892.

Baltimore & Ohio Southwestern.—During the past month 25 miles of 75-lb. rail has been laid on the line between Chillicothe and Parkersburg.

Bridgton & Saco River.—Frederic J. Ilsley, of the firm of Ilsley & Cummings, Civil Engineers, has completed the preliminary survey on the extension of this road from Bridgton, Me., to Harrison. Mr. Ilsley says that the extension will be five miles long, through a beautiful country. After skirting the mountain it follows along the shores of Long Pond, passing through North Bridgton. The grade of the extension will be very easy, and the road can be easily built. There are only three small streams to cross, and the largest bridge will be only a 40-ft. span. The road will probably be built during the coming summer. It will be 2-ft. gage.

Canadian Roads.—Hon. A. G. Blair, the Minister of Railways and Canals of the Dominion of Canada, with an official party has recently returned to Ottawa from an extensive tour of the western portion of the Dominion, undertakes chiefly to investigate the advisability of building a line through the much talked of Crow's Nest Pass. Such a line would be of importance in giving a better outlet to the growing mining district of Southern British Columbia, and the route generally spoken of is from Lethbridge, in the Northwest Territory, via the Crow's Nest Pass in the Rocky Mountains and through the Kootenay mining district to Rossland, B. C. Nothing definite has been published in regard to the results of that visit, but there seems to be ground for stating that the Minister favors the building of such a line. If undertaken it may be built either by the Canadian Pacific or as a government line, the people in British Columbia seeming to prefer that the Government undertake the work. The cost of construction is given as about $9,000,000.

Choctaw, Oklahoma & Gulf.—A party of engineers in the employ of this road have been running prospective lines from Arapahoe, Oaklahoma, for an extension which may be begun in the early spring from Fort Reno west through that country and to the Panhandle of Texas.

Falisburg & Monticello.—This company has been incorporated in New York to build and operate five miles of road, with a capital stock of $75,000. The Directors include J. H. Devoe, who takes 736 of the 750 shares; B. Van Steenberg, John A. Cartledge, C. B. Harris and Lester Rock.

Great Northern.—Maps have beeen filed at Duluth for transmission to Washington for approval, showing that part of the Fosston extension through the state of Minnesota, embracing the Chippewa reservation. The line, as indicated on the maps, extends north of Portage Lake, and north of that body of water goes southeasterly to the southern point of Ball Club Lake, then northeast toward the location of Deer River. If the line is built to Deer River, the Great Northern could enter Duluth over the Duluth, Superior & Western, whose terminus is at Deer River.

Kansas City Northwestern.—The capital stock of this company has recently been increased to provide funds for the extension of the line into Beatrice, Neb. The present western terminus of the line is now at Virginia, Neb., and the distance from that point into Beatrice is 20 miles. The latter town is an important place south of Lincoln, and by the extension the road would secure new connections with the Burlington & Missouri River and the Union Pacific to northern points. The road is controlled by the Missouri Pacific, which operates it independently, with the officers of that company in charge of the road. H. G. Clark, Superintendent of the Missouri Pacific at St. Louis, is General Superintendent of this road.

Kennett & Osceola.—A certificate of incorporation was issued to the company in Missouri last week, with a capital stock placed at $200,000. The company will have its principal office in the city of Cape Girardeau, and is organized to construct a line from Kennett, Dunklin County, to a point on the line between Arkansas and Missouri, to be determined hereafter. The length of the road will be 20 miles, and it will connect at Kennett with the St. Louis, Kennett & Southern road. The directors for the first year are: Louis B. Houck, of Pemiscot County; Leo Dogle, E. F. Blomeyer, R. G. Ranney and R. B. Anderson, of Cape Girardeau.

Manitoba & Pacific.—This company will apply to the Dominion Parliament at its coming session for a charter to build a road through the Crow Nest Pass, in British Columbia, to the Pacific coast.

Mexican Central.—The Laguna extension was completed in December, and was taken over for operation by the company Jan. 1. This line extends from Lerdo on the main line to San Pedro, 39.8 miles, and serves an important cotton acreage in competition with the Mexican International road, already reaching San Pedro.

Montgomery, Tuscaloosa & Memphis.—The application of this company to the City Council of Montgomery, Ala., for an ordinance authorizing it to lay its tracks on certain streets of the city in order to secure an entrance and to reach the proposed station in Montgomery, was not passed by the Council. In place of the application the Council substituted an ordinance authorizing an entrance over the tracks of one of the companies now entering Montgomery, and provided that if the new company could not make satisfactory agreements the Council would authorize it to lay independent tracks, as asked in the original petition. The road is now controlled by the Mobile & Ohio, and is to be built from Montgomery to Columbus, Miss., about 170 miles. Of this distance considerable was graded several years ago by J. W. Woolfolk, who is understood to have the contract for building the road under the agreement of the Mobile & Ohio. The stockholders of that company have recently authorized the directors of the Mobile & Ohio to issue bonds to complete the new road.

Omaha, Minneapolis & Buffalo.—This company has been incorporated to build a road from Iowa, through Minnesota, Wisconsin, Michigan and Canada. Those interested are: Peter E. Brown, F. A. Brown, Joseph Camille, Victor Bertrand and W. F. Hurt. The headquarters are in St. Paul, Minn.

Pennsylvania.—Surveys have been made recently by engineers of the company for a revision of the line through Mt. Holly, N. J., to eliminate certain curves and to give a better line to the New Jersey shore. The work, if undertaken, will involve the removal of the station at Mt. Holly, the building of a number of bridges which will do away with the grade crossings and other changes.

San Antonio & Gulf Shore.—Work was begun Dec. 21 on an extension of this road in Texas. The bridge over the Cibola Creek, at Sutherland Springs, which was partially erected some time ago and which has been the eastern terminus of the line, will be completed in a short time and then it is expected that the road will be rapidly pushed to Stockdale, Wilson County, about 12 miles distant. There the road will stop for the present. The road now extends from San Antonio to Sutherland Springs, about 28 miles, and runs one train per day each way.

Washington County.—Contractor James Mitchell, of Portland, Me., states that satisfactory financial arrangements have been completed with firms in New York City to provide funds to complete the road next year. He proposes to put large forces on the grading on the Ellsworth end of the line as early in the spring as the weather will permit. The line to be built is 120 miles long along the shore line through Washington County in the eastern portion of Maine.

West Virginia Northern.—The company has secured from the County Court of Preston County, W. Va., 10 miles of right of way for the proposed railroad down Cheat River. The Court granted the company the use of an abandoned county road provided that work be commenced at once. This road is to connect with the Baltimore & Ohio at Rowlesburg, W. Va., thence extend down the river to some point near Fairchance, Pa. It will be nearly 50 miles in length and will pass through a hitherto undeveloped section of valuable timber and coal lands. J. J. Stoer and J. F. Stoer, of Philadelphia, who own tracts of this land, are large stockholders in the company, and other Philadelphia people are interested.

Wichita & Western.—Receiver McIntire, who a few weeks ago was authorized by the Kansas State Court to abandon the western 40 miles of this line and to take up the rails, has now completed this work. The rails have been sold to the Atchison, Topeka & Santa Fe for, it is said, $19 a ton. The six stations of the abandoned line have been destroyed and other property of the company removed. The Receiver will continue to operate the line between Wichita and Pratt, 40 miles, the portion abandoned being the line beyond the latter town to Mullinville, Kan.

Electric Railroad Construction.

Ancaster, Ont.—The taxpayers of the Township of Ancaster, who will be directly affected by the Hamilton, Chedoke & Ancaster Electric Railway, have voted a bonus of $5,000 to the projected railway.

Battle Creek, Mich.—There appears to be little doubt but that the Battle Creek & Lansing Electric Railroad will be constructed next spring. The following points will be touched: Bedford, Augusta, Galesburg and Comstock, with a branch from Augusta to Gull Lake. The road will be used for freight as well as passenger service.

Belleville, N. J.—On Jan. 6, the Township Committee granted to the Passaic & Newark Electric Railway Co. a franchise for an electric road from Jerolamon street to the city limits, thus making a direct route from Belleville to Paterson. The road is to be completed in six months. After 10 years the company is to pay a tax of one per cent. of the net earnings in proportion to the the mileage of the road in the township as compared to its total length. The fare to Paterson will be 13 cents, and 26 cents for the round trip. The Erie Railroad at present charges 45 cents for an excursion ticket.

Bowling Green, O.—The Council of Bowling Green has granted an ordinance permitting the Toledo, Bowling Green & Fremont Railroad to construct its line through Bowling Green and requiring an extension of at least five miles beyond the city. Work will be done this winter, a large part of the material being now on the ground. The president of this road is T. H Walbridge, the general manager, C. A. Denman and engineer, H. C. Riggs.

Bridgton, Me.—Surveys are being made for the proposed electric road to connect Norway and Bridgton.

Chicago.—Electric cars have displaced the horse cars on the Blue Island avenue, on Halstead and Milwaukee streets.

Cincinnati, O.—A charter has been granted to the Cincinnati, Hamilton & Dayton Traction Co., which has been incorporated with a capital stock of $50,000 by C. G. Waldo, D. G. Edwards, Geo. R. Balch, R. P. Rifenberick and C. A. Wilson, officers of the C., H. & D. Railroad. As already noted in the *Railroad Gazette*, this company has lately purchased the street-railroad lines in Middletown, O., and intends to operate them in connection with its steam railroad line. The charter now granted apparently gives the right to use electric motive power on any part of the existing lines of the C., H. & D.

Detroit, Mich.—John B. Dyar, of the Detroit & Port Huron Electric Railroad, has accepted the ordinance granted him by the City Council, and deposited a certified check for $2,000 as a guarantee that the road will be completed by Nov. 1, 1897.

Galesburg, Mich.—The Michigan Traction Co. has presented a petition for right of way for a road through Galesburg.

Hartford, Conn.—The following petitions have been filed in the office of the Secretary of State for electric roads in Connecticut: The Newington Tramway Co., for an amendment to charter extending the time for the construction of the road, and for the laying of tracks from the city of New Britain, beginning at Jubilee street. The Rockville & Ellington Street Railway Co., for an amendment to charter to extend time for construction of road. The Central Railway & Electric Co. of New Britain, for an extension of time to construct an extension of road, and to lay tracks from Jubilee street, New Britain, to Congregational church in Newington; also to construct through alternative route, beginning at the corner of Dwight and East streets in New Britain; also to construct a line from Berlin Center to a point opposite the residence of Burr K. Field, in East Berlin, or through alternative route. The Waterbury Traction Co., for an extension of time to construct the proposed road. The Milford Street Railway Co. for the laying of tracks and the increasing of capital stock. The Milton Traction Co., to build a street railroad from Milford to Stratford, to the village of Woodmont, to Derby, through Orange, to New Haven.

Mechanicsville, N. Y.—We are informed that F. O. Sinclair and E. N. Sanctuary, of Burlington, Vt., are preparing to make surveys for on electric road from Lansingburg to Mechanicsville.

Monroe, Mich.—The franchise of the Monroe, Dundee & Lake Erie Railway Co. has been extended. The company proposes to build an electric road from the Flint & Pere Marquette depot on the west side of Monroe to the shore of Lake Erie, a distance of about three miles.

Pittsburgh, Pa.—The Brownsville branch of the Pittsburgh & Birmingham Traction Co. was formally opened on Jan. 7. The line has cost $150,000. The cars are new and built for hill climbing, being supplied with two 50 H. P. motors. The trip from Knoxville into Pittsburgh will be made in 15 minutes.

Quincy, Mass.—The Quincy & Boston Street Railway Co. has been granted permission to lay additional tracks as referred among our notes of Oct. 16.

Rockville, Md.—It is proposed to extend the electric line running from Washington to Bethseda, to Rockville.

St. Louis, Mo.—The Shaw Avenue Electric Railway Co. has been incorporated to build an electric road on Shaw avenue to the new Manchester road, and the company has applied for franchises.

San Antonio, Tex.—The Von Ormy-Medina Railway Co. has been organized to build a road from San Antonio to Von Ormy, a distance of 12 miles. Capital stock, $20.000. President, F. Villereal; General Manager, E. Krause.

Toronto, Ont.—Messrs. Mercier, Bradford & Titus, solicitors, give notice that application will be made to the Ontario government for incorporation of the Toronto Radial Railway Co., to acquire the franchise of the Toronto Belt Line Railway Co. and to change the motive power to electricity.

Westbrook, Me.—A petition will be presented to the next legislature asking for a charter for an electric road from Westbrook through South Windham, North Windham, Raymond, Casco and Naples to Harrison, and perhaps to North Bridgton. Westbrook men are promoters of the enterprise.

GENERAL RAILROAD NEWS.

Atlantic & Pacific.—It is reported that the negotiations which have been pending for some time between the reorganization committee of the Atchison and the

bondholders' committee of this company have reached a point where it is probable that the Atchison will agree to purchase the Atlantic & Pacific first-mortgage bonds, amounting to about $16,000,000, giving in exchange about 45 to 50 per cent. of new Atchison 4's, and 60 per cent. in preferred stock, and also pay the expenses of the New York, London and Amsterdam committees of the Atlantic & Pacific, amounting to about $500,000. This would give the Atchison control of the Western Division of the Atlantic & Pacific, extending from Albuquerque, N. Mex., to Mojave, Cal., where connection is made with the Southern Pacific, and through Barstow, Cal., where it connects with the Southern California lines of the Atchison and would remove all question of a possible interruption of the through line of the Atchison to the Pacific coast.

Boston & Lowell.—At the annual meeting the stockholders authorized an issue of $200,000 20-year 4 per cent. bonds, to be dated Oct. 1, 1895, to retire $200,000 Lowell & Lawrence Railroad bonds, due Oct. 1, 1897. The income account for the year ended June 30, 1896, shows: Gross income, $1,037,347; operating expenses, $824,847; net earnings, $212,500; total surplus of company, $1,423,164.

Carolina & Cumberland Gap.—A circular was issued by Vice-President I. W. Fowler, under date of Dec. 31, stating that on and after that day the road would take possession of and operate the Carolina, Cumberland Gap & Chicago, which extends from Edgefield to Aiken, S. C., 24 miles.

Carolina & Northwestern.—The Chester & Lenoir, which has been in a Receiver's hands for about two years past, is to be reorganized under this name. The charter is not a new one, having been secured from the last state legislature. The Chester & Lenoir is a narrow gage line about 109 miles long, extending from Lenoir, N. C., to Chester, S. C., the company using 10 miles of the track of the Western North Carolina road between Newton and Hickory, N. C. Of the mileage given 72 miles is in North Carolina and the remainder in South Carolina. Only 34 miles of its track is laid with steel rails. It is stated that the new company will make an issue of $450,000 of bonds, of which about $100,000 will remain in the treasury, to be issued to build the line between Newton and Hickory, to give the company a continuous line. The bonds of the old company are issued on two mortgages and bear seven per cent. interest, both mortgages maturing in 1900. The capital stock of the old company outstanding is $348,500. G. W. F. Harper, Receiver and President and Treasurer of the old company for many years, will be the executive head of the new company.

Central of New Jersey.—Earnings for November were:

	1896.	1895.	1894.
Gross earn	$1,148,620	$1,279,684	$1,051,590
Oper. expen. and taxes	647,464	717,320	660,899
Net earn	$501,156	$562,364	$390,691
P. c. expen. to earn	56⅝	56	63
Net 11 months	4,566,148	4,810,696	3,812,137

Net in November, 1893, $479,397.

Central Washington.—A small shareholder has filed a petition in the United States Court at Baltimore, in which he asks for an accounting by the Receivers of the Baltimore & Ohio to the stockholders of the Central Ohio company for 35 per cent. of the gross earnings of the latter road. Judge Morris signed an order directing the Receivers to answer the petition before Feb. 6.

Chicago & Eastern Illinois.—Stockholders are to hold a special meeting in Chicago, on Feb. 17, to ratify the purchase of the Chicago, Paducah & Memphis road.

Chicago Terminal.—A mortgage for $1,500,000, given by the Terminal Railroad Company and the Michigan Central, was filed at Chicago, Jan. 8. The money was borrowed by the Michigan Central, which uses the tracks of the Terminal Road, to complete the construction of a new branch of the Terminal.

Choctaw, Oklahoma & Gulf.—The annual report for year ending Oct. 31, 1896, shows the receipts from all sources of the railroad proper as below

	1896.	1895.
Total earnings	$543,040	$332,317
Oper. exp	340,820	205,858
Surplus over oper. exp	$202.220	$126,459

The receipts from the Mining Department amounted to $536,016, and the expenses $509,630, giving a surplus of $24,368. The output of coal in 1896 was 364,110 tons as against 358,655 tons in the previous year. The surplus of the railroad and Mining Department is $228,607, but after deducting taxes it is reduced to $217,407. The fixed charges on account of interest on bonds amounted to $209,750. During the last year car trust obligations were largely reduced and it is intended to retire all of them on April 1. President Gowen says: "It is believed that there will be a very decided increase in the earnings of the railroad department for the current year. The results for the month of October last, as compared with the month of October, 1895, serve to demonstrate this. The gross earnings of the railroad department in October, 1895, were $51,130, while in October, 1896, they amounted to $74,250.

Colorado Midland.—The committee holders of first mortgage bonds and 4 per cent. consolidated mortgage bonds announces that, as a large majority of both classes of bonds has assented to the extension to July 1 of the bondholders' agreement of Jan. 28, 1895, the committee will proceed to submit a plan of reorganization as soon as practicable.

Everett & Monte Cristo.—The road has again been opened for freight and passenger business to Silverton, Wash., having been closed since the destructive floods in November.

Florida Central & Peninsular.—The company reports earnings for the year ending June 30:

	1896.	1895.	Inc. or dec.
Gross earn	$2,065,510	$2,272,148	D. $206,638
Oper. expen	1,589,774	1,690,318	D. 100,544
Net earn	$475,736	$581,830	D. $106,094
Fixed charges	587,620	577,853	I. 9,767
Deficit	$111,884	sur. $3,977	I. $115,861

The deficit for the year occurred entirely on the leased line, the South Bend Railroad, the Florida Central proper showing a surplus of $17,491.

Florence & Cripple Creek.—This road, which reaches the Cripple Creek mining region in Colorado from the south by a line 40 miles long, starting from Florence, Col., on the Denver & Rio Grande, is reported to have been sold to an English syndicate, with the Midland Terminal, which reaches the same district, with a line 30 miles long from the north. This sale is reported to have been made by President W. K. Johnson, who is now in England for that purpose. No particulars of the terms of the sale are reported in the dispatches giving this information. Both roads were built by local companies. In the former company Mr. D. H. Moffatt, the well-known financier of Denver, is largely interested. In the Midland Terminal Mr. H. H. Colbran, formerly General Manager of the Colorado Midland, and Mr. W. K. Gillette, formerly Auditor of the Atchison, Topeka & Santa Fe, have been the chief stockholders. Recently Mr. Colbran transferred his interest to D. R. C. Brown, a wealthy mine-owner of Aspen, Col.

Galveston, La Porte & Houston.—The company's officers have given legal notice that application will be made to the legislature for authority to authorize the company to consolidate with the Galveston & Western. The two roads are now operated jointly.

Grand Trunk.—The *Canada Gazette* contains a notice that the company will apply to the Parliament of Canada for an act authorizing the company "to aid financially certain railway companies with which the Grand Trunk Company has traffic arrangements"; also authorizing the company to capitalize its revenue over-draft, to increase its borrowing powers by the issue of debenture stock or terminal bonds for an amount the interest on which shall not exceed £50,000 per annum, and to apply certain unexercised borrowing powers granted for specific purposes by prior legislation, to the general purposes of the company. The notice does not give the names of the companies to which the Grand Trunk proposes to give financial assistance.

Illinois Central.—The earnings for November were:

	1896.	1895.	1894.
Gross earn	$1,873,455	$2,157,388	$1,842,031
Op. expen	1,383,988	1,324,091	1,221,462
Net earn	$489,467	$833,297	$610,569
P. c. exp. to earn	73¼	61⅜	66¼
Five Months:			
Gross earn	$9,347,922	$9,422,644	$8,076,520
Op. exp. and taxes	6,705,228	6,100,486	5,845,505
Net earn	$2,642,694	$3,322,158	$2,231,015

Kansas City & Atlantic.—Theodore C. Bates, of Worcester, Mass., President of this road, often referred to as the "Winner" road, has sold 22 miles, extending from Harlem, a suburb of Kansas City, on the opposite bank of the Missouri River, to Pattonsburg, Clay County, the purchaser being the Kansas City & Northern Connecting Company, the northern extension of the Kansas City, Pittsburgh & Gulf. The purchase price is $225,000. The line thus acquired, together with a short line, for the building of which contracts have been let, will give a through line from Omaha to Kansas City, an arrangement having previously been made with the Omaha & St. Louis road. It is also the object to build another short line from Pattonsburg to Trenton, Mo., to connect with the Quincy, Omaha & Kansas City Railroad to Quincy, Ill., controlled by Gilman, Sons & Co., of New York, who have formed an agreement to carry out this plan. As soon as these several northern lines can be joined the Gulf road will be in a position to run trains into Kansas City from Omaha and Quincy, a contract having been made with the Milwaukee road to enter the city over its bridge across the Missouri.

Mr. Bates has a controlling interest in the Winner bridge property, including terminals on both sides of the river. He has announced his plan of completing the bridge, building a new union station and affording an entrance to the city for several railroads reaching the city from the north and east.

Kentucky & Indiana Bridge Co.—This company's property, which includes the bridge over the Ohio River at Louisville and New Albany, 10 miles of railroad, passenger, electric and freight cars, and six motors, is to be sold by Special Commissioner Cassin, within three months, at an upset price of $1,700,000.

Kings County Elevated.—August Belmont, William A. Read and Walter G. Oakman, of New York, are acting as a committee of first mortgage bondholders to formulate plans of reorganization.

Long Island.—The following statement was issued last week: The Corbin interest has been purchased by the United States Mortgage & Trust Co., of New York, for the account of a syndicate, which will act in conjunction with Mr. Pratt in the future development of the interests of the railroad. Among the members of the syndicate are August Belmont, William A. Read of Vermilye & Co., Brown Brothers & Co., Charles D. Dickey, Jr., Theodore A. Havemeyer, Strong, Sturgis & Co., Kessler & Co., Frederick G. Bourne, George F. Baker and others. The syndicate, in co-operating with the Pratt interest in the development and improvement of the property as it now exists, will also take prompt steps toward providing more satisfactory New York and Brooklyn terminal facilities. The Pratt and Corbin interests have been heretofore the controlling interests in the property.

Louisville & Nashville.—The earnings for the half-year ended Dec. 31 were:

	1896.	1895.	1894.
Gross earn	$10,577,945	$10,720,081	$10,186,178
Oper. exp	7,053,649	6,835,639	6,109,095
Net earn	$3,524,296	$3,884,442	$4,077,783
P. c. exp. to earn	66⅝	63¾	60
Surplus	678,456	1,091,613	400,434

Oregon Short Line & Utah Northern.—This road was sold under foreclosure, Salt Lake City, Jan. 9. The Reorganization Committee, through Henry G. Nicholls, was the only bidder, and the road was bid in for $7,185,500. The amount realized on the American Loan & Trust Company's general mortgage was $5,447,500, and on the Ham mortgages on the extensions, $1,738,000.

Philadelphia & Chester Valley.—At a meeting of the directors last week the agreement with the bondholders to reduce the rate of interest on the 4 and 5 per cent. bonds 1 per cent. was received, and the board authorized the bonds to be stamped accordingly, the security holders having agreed to accept the reduction. The total issue amounts to $380,500, and of this amount all but $12,000 have come into the plan. The Reading Company guarantees the reduced interest.

Philadelphia, Reading & New England.—The Bondholders' Committee, of which Mr. John S. Wilson is Chairman, gives notice that, failing a satisfactory adjustment of the affairs of the company in the near future, it proposes to press for a foreclosure of the property. The issue of these bonds amounts to $6,250,000.

Philadelphia, Wilmington & Baltimore.—The report made at the stockholders' annual meeting last week gives the following figures for the year ending Oct. 31: Gross earnings in 1896, $9,047,131, and the previous year $9,142,532, a decrease of $95,401. The expenses were $6,694,007, and for the previous year $6,526,890, an increase of $167,116. Net earnings were $2,353,123 for the previous year, $2,615,641, a decrease of $262,518. The income account was: P., W. & B. Railroad earnings, $4,395,707; expenses, $3,090,353, and the net earnings, $1,205,354. The total earnings of all roads controlled was $9,047,131; expenses, $6,694,007, and net earnings, $2,358,123. The results of the operation of the P., W. & B. road for the year, after deducting expenses, interest on bonds, ground rents, taxes and payment of dividends at 7 per cent., was a surplus of $316,171.

Reading Co.—Mr. Joseph S. Harris, President of the Company, announces officially that, pursuant to agreements made on Dec. 23, 1896, the Reading company has acquired and holds the capital stock and the $20,000,000 bonds issued by the Philadelphia & Reading Railway C., and the capital stock of the Philadelphia & Reading Coal & Iron Co.; also all the equipment, real estate and miscellaneous stocks and bonds formerly owned but separately pledged by the old railroad company. The Reading Company has increased its capital stock to $28,000,000 first preferred, $42,000,000 second preferred and $70,000,000 common. The Reading Company and the Coal & Iron Company have authorized a joint mortgage to secure bonds up to a possible amount of $135,000,000 to be secured on the property of both companies, including the stock and bonds of the railway company. The new bonds thus have the security of the entire Reading system, railways, equipment, real estate, coal lands and miscellaneous stocks and bonds of great value. The new stocks and bonds under the reorganization are expected to be ready for delivery to the public inside of 60 days.

St. Louis, Salem & Arkansas.—A decree of foreclosure has been issued at St. Louis, by United States District Judge Thayer, in the case of the Mercantile Trust Co. of New York against the railroad. Sale is ordered unless within 10 days payment is made of $946,367, the amount of the first mortgage bonds, with interest.

Electric Railroad News.

Defiance, O.—Walter R. Faben has been appointed Receiver for the Defiance Light & Railroad Co., which operates 3½ miles of track.

Montreal, Que.—The earnings of the Montreal Street Railway Co. for December were $103,114, an increase of $8,304 over December, 1895.

New Brighton, S. I., N. Y.—On Saturday of last week Justice Barnard dismissed the injunction restraining the Staten Island Electric Co. from building its line on Castleton avenue, in New Brighton, over which a bitter contest occurred a few weeks ago between the company, the Staten Island Midland Railroad and the New Brighton Board of Trustees. The company will begin within a few days to complete the work on the avenue.

New Haven, Conn.—On Jan. 1 the New Haven & Centreville Electric Railroad passed into the hands of the Fair Haven & Westville Railroad, and will hereafter be operated as a portion of the line of the latter company.

Toronto, Ont.—The total earnings of the Toronto Railway Co. for 1896 were $986.501, the city's share being $78,921. The mileage account for the year amounts to $60 000, of which there is still due the city $23,000. The gross car earnings for December were $92,660.

Youngstown, O.—The Mahoning Valley Electric Railway Co., which operates 10 miles of road, has placed on record a mortgage to the Central Trust Co., of New York, for $1,200,000. The money will be used in taking up bonds and making extensive improvements.

TRAFFIC.

Traffic Notes.

A Louisville paper states that 30 carloads of quarter-sawed oak lumber from Memphis recently passed through that city in a single train bound for New York City.

On Jan. 6th 160 carloads of salt were shipped from Silver Springs, N. Y., to various points in New England. The third section of the train carrying this salt also carried a passenger car, in which were representatives of the shippers and a number of reporters. There were 14,222 barrels of salt, some of them containing bags, and 10,774 sacks loose.

The Joint Traffic Association employs at New York a general agent, who, with a force of inspectors, looks after the storage of flour, enforcing obedience to the rules made by the Association.

The Galveston Wharf Co., Galveston, Tex., will build an elevator next season to hold 700,000 bushels of corn. There will be facilities for unloading 200 cars a day. The architects and contractors are James Stewart & Co., of St. Louis.

The managers of the Joint Traffic Association have recommended an advance of $2 in immigrant passenger rates on March 1, making the rate, New York to Chicago, $15, which is only $2 less than the first-class rate by the slowest road.

The Consolidated Canal & Lake Co., the concern which Erastus Wiman has been exploiting for several months, has been formally incorporated at Albany, N. Y., for the purpose of building and operating boats to run on the Great Lakes, the Erie Canal and the Hudson River. Charles A. Pillsbury, of Minneapolis, is one of the directors. The Dock Board of New York City has voted to rent to this company Pier 54, North River, for $3,500 a year, and it is said that the company will build upon the dock a two-story steel shed 50 ft. × 500 ft.

The Vandalia Line has abandoned its freight station in St. Louis and will deliver and receive freight at its station in East St. Louis, which is reached by ferry-boats. It appears that the Vandalia has reached its station in St. Louis over the Merchants' Bridge, and that, in consequence of the somewhat unfavorable location of the station, an agreement had been made between the different railroads crossing the river to allow the Vandalia to make rates two or three cents per 100 lbs. less than the other lines; but this differential is now objected to by the other lines and the arrangement had to be discontinued. The building in St. Louis that has been occupied as a freight station is owned by the Pennsylvania Company.

The Board of Administration of the Southwestern Traffic Association has adopted a ruling which provides that, in order to save the expense of inspectors or joint agents at the Rio Grande crossings, all freight destined to Mexican points is to be billed on the through rate; but that when the same is delivered at the Rio Grande

crossings, full local rates up to that point are to be collected and retained by the agent at the crossing until the Mexican lines satisfy the agent that the shipment has been forwarded as transferred, entire and intact, and that the freight has had no movement or handling other than that essential to customs inspection on bona fide through and continuous shipments, when the through rate will be protected. When freight is delivered to merchants, brokers, or other local consignees at the crossings, either in the United States or in Mexico, full local rates to the Rio Grande crossings are to be retained.

Chairman Midgley announces that, the Trunk Lines having modified their rule in regard to honoring requests for transportation, so as to include applications from traffic managers and general freight and passenger agents, in addition to requests from the presidents, vice-presidents, general managers and general superintendents, the Western lines are at liberty to exercise the same latitude.

The Central Traffic Association roads decline to issue annual or time passes to officers or agents of fast freight lines other than those operating over the road of whom passes are requested. The Western lines require requests to come from the executive officer of the controlling road in the line.

The managers of the Joint Traffic Association, to promote the better supervision and revision of tariffs, have amended the rules on the subject as follows: "Resolved, That, effective May 1, 1897, the lines shall be directed (whether they issue interline tariffs or not) to agree with competitors, and to record the bases, in joint meeting, of fares from all junction and important points to the important and controlling centers in the territory of the Joint Traffic Association, and that such bases shall in every respect be clear and comprehensive and form a part of the files of the Joint Traffic Association, from which proposed future changes may be readily investigated for approval, and that where necessary new rate sheets be prepared superseding all through or interline tariffs previously filed, to be made simultaneously effective; tariffs already issued, which are at said meeting agreed to need not be reprinted, but must be refiled as effective upon above date.'

The trunk line railroads and the principal Lake steamboat lines have for some time been negotiating a traffic agreement for next season, looking to the better maintenance of rates; and it is reported that the main features of an agreement have been agreed upon, although none has been signed. Several of the boat lines are controlled by the railroads. At a conference in New York last week with the Board of Managers of the Joint Traffic Association, there were present, as members of the association, the Western Transit Company, Union Steamboat Company, Erie and Western Transportation Company, Northern Steamship Company, Lackawanna Transportation Company, Lehigh Valley Transportation Company, Union Transit Company, and the Minneapolis, St. Paul and Buffalo Steamship Company; and non-members, applicants for admission, Port Huron and Washburn Line, Ogdensburg Transit Company, Lake Erie Transportation Company. Clover Leaf Line, and the Cleveland and Buffalo Transit Line.

The Kansas City Freight Bureau.

Mr. Vanlandingham, Commissioner of the Kansas City Transportation Bureau, issued to the merchants interested in that Bureau a "New Year's Greeting," in which, among other things, he said:

The merchants of Kansas City, acting through the Bureau, have enabled Kansas City to command the respect of the railroad officials throughout the country, while it is well known that we stand up for our rights under all circumstances, and take whatever steps are found necessary to protect them. We have asked for no discriminations in our favor: hence have the reputation of being fair and reasonable in our demands.

There is still great room for improvement in our railroad situation. Rates to many territories are unfairly adjusted to Kansas City. Rates are largely matter of agreement between conflicting railroad interests, and where our rates are most unfair to Kansas City they are usually caused by lines having no rails to Kansas City and no interest in common with us. Regardless of these antagonisms, many discriminations have been removed or reduced in the past year. The worst condition exists as to grain, although there has been very great improvement in grain rates in the past 90 days. The changes incident to the development of the Gulf ports, new gateways and other conflicting interests have prevented the railroads from agreeing upon an adjustment satisfactory to any market. Kansas City, St. Louis, Chicago, Gulf ports and the Eastern seaboard all complain of discriminations against them; all are to a certain extent correct, and no one is making any greater effort to correct them than the railroad officials themselves.

These conditions, however, will require much work on the part of this office and the Transportation Committee, during the coming year, and may require the aid of all the interests of the Bureau to protect our grain market. Recent improvements in live stock rates, while beneficial to Kansas City, will prove of still greater benefit to the country surrounding us. In fact, the territory surrounding Kansas City profits as much by the work of this Bureau as its members themselves. If every member will make it a point to have his traveling men advise him of railroad troubles they meet with, and will keep this office advised of all discriminations, whether in rates, time, or classification, and at the same time "kick" direct to the railroads interested, we will at least be able to hold our own against other cities.

The legislatures of surrounding states will convene this month, and, if reports are true, legislation antagonistic to railroad interests will be a leading question. It is to the interest of every one in this territory to have as little new legislation of this nature as possible. I know of no crying evils in railroad conditions which legislation will remedy without the risk of greater evil resulting therefrom. Railroads, like other interests, have suffered from the prevailing hard times, and most of their net earnings for the next two years must of necessity be spent in improving their tracks, stations, etc. (*i. e.*, for labor and materials), and conditions beyond their control will force reasonable rates upon the products of the territory. One amendment to the Kansas railroad law would benefit both shippers and railroads—*i. e.*, to make time allowed for advance in rates ten days instead of sixty as now. The change would make state law uniform with the Interstate Commerce Act.

An amendment to the Interstate Commerce Act will be again attempted by the railroad interests, legalizing pooling of railroad earnings. Every shipper who has given the matter careful thought is opposed to legalizing pooling specifically, for the same reason that he is opposed to specifically legalizing trusts of any other nature. The organization and maintenance of the Joint Traffic Association, the Southwestern Traffic Association and the Western Freight Association are the best evidence that the railroads, under present law, have all the authority needed to protect themselves when they desire to do so, hence should let well enough alone. Conditions have materially changed since the Patterson bill was indorsed by commercial organizations throughout the country.

We have handled directly or in an advisory way a large number of claims during the past year. Practically all having a legal foundation have been collected.

We have a very complete tariff file, and should you fail to get needed rates from railroads interested, in most cases you will find them on file in this office and can secure them by telephone. We hope to re-issue the Shippers' Guide in 1897.

The St. Louis Freight Bureau.

The interest of the merchants of St. Louis in rates for the transportation of freight over the railroads leading to and from that city, and the alleged need of reductions in many tariffs, was the subject of a long report by Traffic Manager J. S. Leeds at the annual meeting of the Business Men's League in that city, Jan 5. Mr. Leeds says that important changes are constantly taking place in the field of transportation around St. Louis, new enterprises being started and old ones enlarged. From the tenor of the report we conclude that this state of things is accepted as largely inevitable, though the report goes on to name a dozen different matters in which the railroads are alleged to be discriminating against St. Louis. The application of East St. Louis rates to and from points on the Mississippi, north of St. Louis, is one of the things that are wrong; local freight rates much higher in Missouri than across the river, in Illinois, also harm the state. The trade of Western Missouri has been diverted largely to Kansas City, mainly by the vigorous action of the Kansas City, Fort Scott & Memphis. The union of the Omaha & St. Louis with the Quincy, Omaha & Kansas City is likely to prove disadvantageous to the city of St. Louis, and the Kansas City, Pittsburgh & Gulf, when completed, will take away some trade from St Louis. The continuance of high rates to prominent points in the Southern states is an injustice still remaining, as is also the bridge arbitrary at St. Louis The readjustment of the Texas freight tariff has seriously curtailed L. C. L. trade between St. Louis and that state.

Mr. Leeds complains that lines carrying freight west from New Orleans (freight from New York by boat) have induced the trunk lines to take freight eastward from Ohio which ought to go south through St. Louis. Another thing that is wrong is the unequal basis of representation of the different roads in the Board of Managers of the Southwestern Traffic Association. The movement of grain to the gulf ports is looked upon as depriving St. Louis of business naturally tributary to her. The roads leading to the Atlantic ports, in order to prevent this movement to the Gulf, make rates direct from the grain fields to the seaboard, and this again injures St. Louis.

Mr. Leeds envies Kansas City because one road, the Kansas City, Ft. Scott & Memphis, always works exclusively for the interest of that city, whereas all the roads coming to St. Louis have other cities in which they are interested.

In his conclusion, speaking of the general question of negotiations between the city and the railroads, Mr. Leeds says: Questions of mutual interest settle themselves and require no special intervention at our hands. It is problems which are beyond the lines of mutuality of interest, but which from a St. Louis standpoint need correction, that most require our attention. The doctrine of co-operation and mutuality of interest in its general application, with respect to both the mercantile and transportation interests, is a delusion. If adhered to literally, we would never accomplish a result worthy of the effort. Such argument is frequently used for the purpose of defeating proper organization and effective work. This transportation problem requires purely common sense treatment on about the same general lines as would be applied to other classes of business. We should deal with transportation interests according to the ethics employed by them in dealing with each other and with the public.

If a strong and compact organization is kept up the the railroads can be met on an equal footing. The best way to maintain harmony is to be properly prepared for aggressive work, if that is required.

Cincinnati's Disappointment.

In a letter, published in Chicago, Commissioner Wilson, of the Cincinnati Freight Bureau, declares that the recent decision of the United States Court (by Judge Sage, *Railroad Gazette*, Nov. 20 and Dec. 11), refusing to order a reduction of freight rates from Cincinnati southward, defers, if it does not defeat, the hope of the Cincinnati and Chicago merchants for relief against "an admittedly defective and unjust system of freight rates" which has been in force and has operated against the interests of the Northwest for nearly 20 years. He declares that the case was decided, not upon its merits, but simply upon a point of law, and adds:

"Hence the railway companies, the commercial societies and communities, as well as the learned counsel who have labored through several years, looking to the United States Court for light, find themselves just where they started, so far as the vexed commercial issues involved are concerned. Of course, the Interstate Commerce Commission will pursue an appeal, and in the meantime the railroads will collect and the community must pay for transportation upon a basis which has not yet been successfully defended—upon a basis which should in equity and good conscience be modified.

"We are assured, and correctly so, upon the highest authority, that the rates of compensation collected by the railroads of the country for the movement of freight have, during the last decade, undergone great shrinkage; yet the rates upon the higher classes of merchandise to the interior south are to-day practically as they were fixed in convention twenty years ago. In the meantime, commercial communities and societies must continue to agitate—agitate! If the courts find the law deficient Congress can make it effective, but, after all, the managers should recognize the danger to corporate interests which attends legislation, and should establish with the people whom they serve such equitable relations and cordial understanding as will minimize the public sentiment which supports adverse legislation."

Chicago Traffic Matters.

CHICAGO, Jan. 13, 1897.

The trial of Reinhart and Hanley, ex-officials of the Atchison, Topeka & Santa Fe, attracted a great deal of attention, but, as had been anticipated, the case against Reinhart was nolled and Hanley was acquitted by a jury, which was not out ten minutes. The nolle prosequi in Reinhart's case was entered after Judge Grosscup ruled that, to convict him, the government must show that he was in this district when the offense was committed; and Hanley's acquittal was confidently predicted before his case went to the jury, the government's evidence having been poorly presented.

The charges against Mr. Hanley were that in October, 1892, as General Traffic Manager of the Santa Fe, he had knowledge of rebates paid to the George H. Hammond Packing Company and Isaac Thompson on live stock shipments. The first shipment was one of 178 carloads of cattle shipped from Kansas City by Isaac Thompson. The regular rate was then 23½ cents. The indictment charges that Reinhart and Hanley gave a rebate of $5 a car to Thompson. The second is an alleged shipment in 1892 to the G. H. Hammond Packing Company, and the payment to W. P. Jenkins, the Manager of the company, of a like rebate of $5 a car, the payment having been made Oct. 12, 1892.

Mr. Taylor (the Kansas City agent who had been discharged and who was the chief witness for the government) said that on the afternoon of Oct. 15, 1892, Thompson called at Mr. Hanley's office in Chicago and asked for an immediate settlement of his rebates and damages and loss claims. Hanley, so Taylor testified, told him to pay Thompson, and as the offices of the company were then closed, Taylor gave Thompson his personal check for $1,128, of which $990 was the agreed rebate on 178 cars of cattle. Taylor detailed the direction to him by Hanley to check up and O. K. the claims of the Hammond Packing Company for $2,980 rebate on 596 cars, with the understanding that the Hammond Company was to give the Santa Fe Company all of its trade in the future on the basis of the same rebate.

Judge Grosscup, in his charge, said, referring to the denunciation of railroads in general by the government attorneys: "Railroad corporations are no better than the men behind them, and the men behind them are usually such men as have charge of more or less serious affairs in the community. You must not look at this case through the distorted lenses of prejudice against railroads."

The court then drew the distinction between the payment of a rebate and the understanding that a shipment was made at a less rate than the regular one. He said that Hanley was not on trial for the payment of a rebate, but for agreeing to a deviation from the regular rate of shipment, and that this fact must be borne in mind by the jurors.

He said it was not a crime under the section upon which the indictment was based if it was shown that the rebate was paid as an after consideration, as a yielding to a demand. That was a crime under another section of the law, not now in question.

The giving of a rebate was not a crime alone, unless it was established that there had been an agreement at the time of the shipment. "If," said the court, "Hanley had no knowledge of the original agreement, then the payment of the rebate was not a crime. Taylor, if you believe him, connects Hanley in some way with the transaction relating to the rebate. If Taylor's testimony is broad enough to carry Hanley's wilful and knowing conduct back to the original agreement concerning the shipments, then the question is, do you believe Taylor?

"Right here comes the pertinency of the testimony introduced by the defendant. Are you satisfied that Taylor by an arrangement with the president of the company, without the knowledge of Hanley, was to offer these rebates to shippers? Did Hanley know at the time of these shipments that there was such an understanding between Taylor and the president of the company or that such an understanding existed?

"The defendant has introduced proof tending to show that Taylor had told different persons that the President of the company had no confidence in Traffic Manager Hanley, and had invested him (Taylor) with power to make rebates or a departure from the rate. There is also testimony in the record of a letter written by Taylor in 1892, tending to show the same result, in which occurs the language. 'No one in the Santa Fe employ knows the arrangement I have with the President.' There is a letter introduced written by Hanley in February, 1892, to Taylor, in which he says: 'We cannot pay rebates and will have to make the best fight with the tools at our command.' (The President in 1892 was Mr. Manvel, who died in February, 1893, and was succeeded by Mr. Reinhart.)

"The jury should, with great caution, inspect the testimony of a participant in crime. It is better that such testimony be corroborated in every point. The nerve point in this case is the corroboration of Hanley's connection with it. You are at liberty to believe Taylor without corroboration. I find it my duty as a Judge to caution you against easily believing a man who has been a participant in crime, without corroboration."

The report of the receipts of grain at Chicago for the year 1896 over the Western roads shows a total of 292,424 cars received, an increase of 69,659 cars over the year 1895. The figures show that the Burlington had 17.7 per cent. of the business, the Rock Island 13.6 per cent., Northwestern 12.4 per cent., Chicago, Milwaukee & St. Paul 11.7 per cent., and the Chicago Great Western 3.6 per cent. Following is a statement giving the number of cars hauled by the different roads in 1896, as compared with the three previous years:

	1896.	1895.	1894.	1893.
A., T. & S. Fe	12,378	7,616	9,429	17,478
C., B. & Q.	51,762	32,985	29,775	49,430
C., R. I. & P.	40,055	20,858	16,780	27,365
C. & Alton	18,073	17,543	14,405	13,837
C. & N. W.	36,156	29,753	23,050	39,687
C. & E. Ill.	10,598	10,793	11,462	6,731
C., M. & St. P.	34,338	20,258	19,723	36,215
C. Gt. W.	10,813	4,492	4,979	10,808
Ill. Cent.	37,271	36,889	56,694	39,967
Wabash	13,534	16,649	15,377	11,208
Wis. Cent	212	280	283	221
E. J. & E.	11,448	.....	.....	.....
Other roads	15,786	24,654	21,901	20,086
Total cars	292,424	222,765	204,408	273,033

Eastbound shipments from Chicago and Chicago junctions to and beyond the western termini of the trunk lines for the week ending Jan. 7 amounted to 72,584 tons, as compared with 76,782 tons the preceding week. This statement includes: Grain, 34,269 tons; flour, 7,114 tons; and provisions, 9,113 tons, but not live stock. The following is the statement in detail for the two weeks:

Roads.	Week to Jan. 7.		Week to Dec. 31.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	6,784	9.3	6,197	8.1
C., C., C. & St. Louis	8,047	11.1	12,168	15 8
Chicago & Erie	5,294	7.3	5,825	7.6
Grand Trunk	5,832	8.0	10,532	13.7
L. S. & M. S.	10,572	14.6	9,636	12.6
Michigan Central	12,337	14 0	8,930	11.6
N. Y., Chi. & St. L.	5,174	7.6	7,096	9.2
Pitts., Cin., Chi. & St. Louis	5,561	7.7	5,568	7.3
Pitts., Ft. Wayne & Chicago	7,658	10.6	6,977	9.1
Wabash	5,023	6.7	3,853	5.0
Totals	72,584	100.0	76,782	100.0